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ABSTRACT

This economic assessment informs the public about the implications of the final accessibility guidelines for play areas issued by the Access Board. The guidelines include scoping and technical provisions, which specify when and how access is to be provided to ground level and elevated play components. The guidelines also address soft contained play structures. Chapter 1 discusses the statutory authority for the guidelines, the history of the rulemaking, and the need for the guidelines in terms of market failure and civil rights. Chapter 2 summarizes the final guidelines and the changes made from the proposed rule in response to the public comments. Chapter 3 estimates the number of new and replacement play areas constructed annually, based on the types of establishments affected by the guidelines and size categories of play areas (small, medium, and large). Chapter 4 estimates the incremental costs of the guidelines for a small, medium, and large model play area, based on the incremental costs of the models and the effect of the incremental costs on the number of new and replacement play areas constructed. The chapter also estimates the social and the direct costs of the guidelines, which yield the total annual cost of the guidelines. Chapter 5 discusses the benefits of the guidelines. (Contains 54 references.)(GR)

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ED 450 547

UNITED STATES ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD

FINAL ACCESSIBILITY GUIDELINES FOR PLAY AREAS

ECONOMIC ASSESSMENT

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Prepared by the EOP Foundation
Washington, D.C.

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EF 005 840

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TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... -1-

DEFINITIONS ..... -5-

CHAPTER 1: BACKGROUND ..... -6-
1.1 Overview ..... -6-
1.2 Statutory Authority ..... -6-
1.3 Regulatory History ..... -7-
1.4 Statement of Need ..... -9-

CHAPTER 2: DESCRIPTION OF GUIDELINES ..... -11-
2.1 Final Guidelines ..... -11-
2.2 Changes from Proposed Rule ..... -16-

CHAPTER 3: NUMBER AND SIZE OF PLAY AREAS AFFECTED BY GUIDELINES ..... -18-
3.1 Overview ..... -18-
3.2 Number and Size of New and Replaced Play Areas ..... -22-
3.2.1 Eating Places ..... -22-
3.2.2 Hotels and Motels ..... -22-
3.2.3 Sporting and Recreational Camps ..... -23-
3.2.4 Recreation Vehicle Parks and Campsites ..... -24-
3.2.5 Miscellaneous Amusement and Recreation ..... -24-
3.2.6 Public Schools ..... -25-
3.2.7 Private Schools ..... -27-
3.2.8 Child Day Care Services ..... -28-
3.2.9 Civic, Social, and Fraternal Associations ..... -30-
3.2.10 Municipal and State Parks ..... -30-

CHAPTER 4: COSTS OF GUIDELINES ..... -32-
4.1 Overview ..... -32-
4.2 Baseline ..... -32-
4.3 Model Play Areas ..... -35-
4.3.1 Unit Costs ..... -36-
4.3.2 Small Play Area ..... -37-
4.3.2.1 Impact of the Guidelines ..... -39-
4.3.2.2 Incremental Equipment and Surface Costs ..... -40-
4.3.3 Medium Play Area ..... -41-
4.3.3.1 Impact of the Guidelines ..... -44-
4.3.3.2 Incremental Equipment and Surface Costs ..... -44-
4.3.4 Large Play Area ..... -46-
4.3.4.1 Impact of the Guidelines ..... -49-

4.3.4.2 Incremental Equipment and Surface Costs ..... -50-
4.3.5 Summary of Incremental Equipment and Surface Costs ..... -53-
4.4 Maintenance Costs ..... -53-
4.4.1 Unit Costs ..... -53-
4.4.2 Impact of Guidelines on Use Zones and Accessible Surfaces ..... -55-
4.4.3 Incremental Maintenance Costs (Savings) ..... -56-
4.5 Aggregate Costs ..... -57-
4.5.1 Full Incremental Costs (Savings) ..... -57-
4.5.2 Social Costs ..... -58-
4.5.3 Total Annual Costs ..... -60-

CHAPTER 5: BENEFITS OF GUIDELINES ..... -62-
5.1 Overview ..... -62-
5.2 Increased Social Welfare ..... -62-
5.3 Increased Social Equity ..... -63-

EXECUTIVE SUMMARY

Introduction

The purpose of this assessment is to discuss and, where possible, quantify the costs and benefits of the final accessibility guidelines for play areas issued by the Architectural and Transportation Barriers Compliance Board (Access Board) under the authority of the Americans with Disabilities Act. The guidelines are intended to provide minimum accessibility requirements for play areas designed for children ages two and over. The guidelines will affect children with disabilities, their parents, and owners and operators of play areas. The guidelines apply only to newly designed and newly constructed play areas and existing play areas that are altered. When adopted by the Department of Justice as standards, all newly designed and newly constructed and all altered play areas must comply with the guidelines.

Need for Standards

The improvements in accessibility expected to result from these guidelines are intended to address the following conditions that may persist in the absence of the guidelines.

- Many play areas are designed in such a way that they are not accessible to children with disabilities. Children with disabilities are prevented from getting to, through, and off ground level and elevated play components because there is no accessible ground surface and no means (i.e., ramp or transfer system) to access composite play structures. This lack of access deprives these children of the ability to benefit from the opportunities for education and entertainment. Alternatively, it requires that the parents of these children bear higher costs – through increased travel times or provision of alternative play environments – to provide their children with these benefits.

- Play areas provide unique opportunities for children to interact and develop socialization skills. If children with disabilities lack these play opportunities, or only have segregated play opportunities, children with and without disabilities, cannot take advantage of this socialization. These socialization benefits are a public good that would remain under-provided in the absence of these guidelines. Congress has decided that accessibility to newly constructed and altered play areas is a socially preferred choice that is an essential component of civil rights for persons with disabilities.

Number and Size of Play Areas Affected

The following major business and government categories are likely to own or operate play areas in conjunction with their primary purpose:

Eating Places

Hotels and Motels
Sporting and Recreational Camps
Recreational Vehicle Parks and Campsites
Miscellaneous Amusement and Recreation
Public Schools
Private Schools
Child Day Care Services
Civic, Social, and Fraternal Associations
Municipal and State Parks

For each category, we estimate the number of establishments that are likely to have play areas and the number of play areas expected to be constructed or replaced annually. In addition to the diversity of ownership, play areas come in many different sizes. We considered three different model size play areas (small, medium, large) and estimate the distribution of play area sizes for each category. Table ES-1 shows the estimated number of play areas by size that would be constructed or replaced each year in the absence of these guidelines.

Table ES-1

Play Area Size	Lower Bound Estimates	Upper Bound Estimates
Small	7,800	10,400
Medium	6,400	8,300
Large	3,200	5,200
Total Play Areas	**17,400**	**23,900**

Costs of Guidelines

We estimate the direct and social costs of the guidelines using three different model size play areas (small, medium, and large). The direct costs include the incremental equipment and ground surface costs for designing the model size play areas to comply with the guidelines, compared to a baseline design in the absence of the guidelines, and the incremental maintenance costs (savings) for two ground surface options for the model size play areas. We also estimate the loss of play opportunities resulting from fewer or smaller play areas being built in response to increased costs resulting from the guidelines. This is the social costs of the guidelines. Table ES-2 shows the estimated range of the total annual costs of the guidelines.

Table ES-2. Total Annual Costs of Guidelines
($ in millions)

All Play Areas	Surface Option 1: Engineered Wood Fiber	Surface Option 2: Rubber & Loose Fill
Social Costs		
Low	$ 8	$ 3
High	$ 12	$15
Direct Costs		
Low	$29	$18
High	$ 61	$69
Total Annual Costs		
Low	$37	$21
High	$ 73	$84

Benefits of Guidelines

The guidelines will produce increased social welfare and increased social equity. Increased social welfare results from increasing the number of accessible play areas. Increasing accessibility will make more play areas accessible to the 5.1 million children with disabilities between the ages of 3 and 14. Parents of children with disabilities also benefit from lower travel costs to take their children to accessible play areas.

Children with disabilities benefit from the increased opportunities to play and to have social interaction with other children. Children without disabilities also benefit from this diversity. Increased accessibility to play areas will provide children with greater exposure to diversity an early age which can help develop higher intellectual and better socialization skills valuable later in life. This analysis does not attempt to measure the benefits to children with and without disabilities that result from the guidelines. Major uncertainties preclude the quantification of these benefits. It is not clear what the appropriate unit of measure should be for diversity or how many units of diversity a child would gain from an accessible play area. It is also not clear how these units of diversity are related to future social benefits.

Not all government policies are based on maximizing economic efficiency. Even when the market is operating efficiently, there may be groups or individuals who are subject to discriminatory practices and remain "under-served." In these instances it may be socially desirable to redistribute benefits to those populations that receive less than their "fair" share of goods and services at the market equilibrium. Policies based on furthering the rights of certain groups of individuals provide more equitable distributions of benefits, regardless of the effect on economic efficiency. The Americans with Disabilities Act is a civil rights law that was enacted by overwhelming bipartisan majorities in Congress and reflects the societal decision to eliminate the various forms of discrimination continually encountered by individuals with disabilities, including the discriminatory effects of architectural barriers. Traditional cost-benefit analysis is deficient when it comes to

measuring civil rights benefits and making judgements about fairness or equity. Society relies on political processes to make decisions about redistribution of benefits based on equity considerations. While traditional cost-benefit analysis is not despositive in making equity-based decisions, it can inform the policy makers as they make redistribution decisions.

DEFINITIONS

Play Area is defined as a portion of a site containing play components designed and constructed for children.

Play Component is defined as an element intended to generate specific opportunities for play, socialization, or learning. A play component may be manufactured or natural, such as a garden or land form.

Elevated Play Component is defined as a play component that is approached above or below grade and is part of a composite play structure consisting of two or more play componen a ched or functionally linked to create an integrated unit that provides more than one play activity.

Ground Level Play Component is defined as a play component that is approached and exited at the ground level. Stand alone slides, balance beams, swings, and spring rockers are examples of ground level play components.

Use Zone is defined as the ground level area beneath and immediately adjacent to a play structure or equipment that is designated by the ASTM F 1497 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

Soft Contained Play Structure is defined as a play structure made up of one or more components where the user enters a fully enclosed play environment that uses pliable materials (e.g., plastic, netting, fabric).

CHAPTER 1

BACKGROUND

1.1 Overview

This economic assessment was prepared to meet the requirements of Executive Order 12886 and other requirements, and to better inform the public about the implications of the final accessibility guidelines for play areas issued by the Access Board. The guidelines include scoping and technical provisions, which specify when and how access is to be provided to ground level and elevated play components. The guidelines also address soft contained play structures.

Chapter 1 discusses the statutory authority for the guidelines, the history of the rulemaking, and the need for the guidelines in terms of market failure and civil rights.

Chapter 2 summarizes the final guidelines and the changes made from the proposed rule in response to the public comments.

Chapter 3 estimates the number of new and replacement play areas constructed annually based on the types of establishments affected by the guidelines and size categories of play areas (small, medium, and large).

Chapter 4 estimates the incremental costs of the guidelines for a small, medium, and large model play area. Based on the incremental costs of the models and the effect of the incremental costs on the number of new and replacement play areas constructed, Chapter 4 also estimates the social and the direct costs of the guidelines, which yield the total annual cost of the guidelines.

Chapter 5 discusses the benefits of the guidelines.

1.2 Statutory Authority

The Americans with Disabilities Act is a comprehensive civil rights law which prohibits discrimination on the basis of disability. Title II and III of the Americans with Disabilities Act require, among other things, that newly designed and newly constructed State and local government buildings, places of public accommodation, and commercial facilities be readily accessible to and usable by individuals with disabilities. Existing facilities that are altered are also subject to accessibility requirements.

The Access Board is an independent Federal agency established by section 502 of the Rehabilitation Act whose primary mission is to promote accessibility for individuals with disabilities.[1] The Access Board is responsible for developing accessibility guidelines to ensure that new construction and alterations of facilities covered by titles II and III of the Americans with Disabilities Act are readily accessible to and usable by individuals with disabilities. The Access Board initially issued the Americans with Disabilities Act Accessibility Guidelines (ADAAG) in 1991. ADAAG consists of general sections (ADAAG 1 to 4) that apply to all types of buildings and facilities, and special application sections (ADAAG 5 to 12) that contain additional requirements for certain types of buildings. The play area accessibility guidelines developed by the Access Board will be part of a special application section for recreation facilities (ADAAG 15).[2]

The Department of Justice is responsible for issuing regulations to implement titles II and III of the Americans with Disabilities Act. The regulations issued by the Department of Justice must include accessibility standards for newly designed and newly constructed, and altered facilities covered by the law. The standards must be consistent with ADAAG.

1.3 Regulatory History

Recreation Access Advisory Committee

Titles II and III of the Americans with Disabilities Act cover a variety of recreation facilities such as amusement rides, boating and fishing facilities, golf courses, play areas, sports facilities, and trails. While the existing sections of ADAAG cover these facilities, some recreation facilities have unique features for which special application sections are needed. In July 1993, the Access Board convened a Recreation Access Advisory Committee as the first step in developing special application sections for recreational facilities. The advisory committee issued a report in July 1994, which addressed the various types of recreation facilities and identified the features of each facility type that are not adequately addressed by ADAAG. The advisory committee report included recommendations for developing accessibility guidelines for those features.

Advance Notice of Proposed Rulemaking

In September 1994, the Access Board published an Advance Notice of Proposed Rulemaking (ANPRM) requesting public comment on the advisory committee's recommendations. 59 FR 48542 (September 21, 1994). The public comments expressed support for many of the advisory committee's recommendations. However, the public comments showed a lack of consensus on some

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[1] The Access Board consists of 25 members. Thirteen are appointed by the President from among the public, a majority of who are required to be individuals with disabilities. The other twelve are heads of the following Federal agencies or their designees whose positions are Executive Level IV or above: The departments of Health and Human Services, Education, Transportation, Housing and Urban Development, Labor, Interior, Defense, Justice, Veteran Affairs and Commerce; General Services Administration; and United States Postal Service.

[2] ADAAG 13 is reserved for residential housing and ADAAG 14 is reserved for public rights-of-way.

major issues regarding play areas among interests that potentially would be affected by guidelines for those facilities.

Play Areas Regulatory Negotiation Committee

Since there was a lack of consensus on the advisory committee's recommendations for play areas, the Access Board decided to develop a special application section for play areas through regulatory negotiation. Regulatory negotiation is a supplement to the traditional rulemaking process that allows for face-to-face negotiations among representatives of affected interests, including the agency, with a goal of arriving at a consensus decision on the text of a proposed rule. The proposed rule is then published in the *Federal Register* and the public has an opportunity to comment. Based on public comments received, the final rule may differ from the proposed rule.

In March 1996, the Access Board established a regulatory negotiation committee to develop a set of proposed accessibility guidelines for play areas. The membership of the regulatory negotiation committee included:

American Society of Landscape Architects
ASTM Public Playground Subcommittee (F 15.29)
ASTM Soft Contained Play Subcommittee (F 15.36)
ASTM Playground Surfacing Systems Subcommittee (F 08.63)
International Play Equipment Manufacturers Association
National Association of Counties
National Association of Elementary School Principals
National Child Care Association
National Council on Independent Living
National Easter Seal Society
National League of Cities
National Parent-Teacher Association
National Recreation and Park Association
Spinal Bifida Association of America
TASH
United Cerebral Palsy Associations
U.S. Access Board

The regulatory negotiation committee identified basic principles to guide its negotiations and agreed that the accessibility guidelines for play areas should:

- Use children's anthropometric dimensions and other resource information;
- Accommodate children with disabilities using a variety of assistive devices;
- Provide opportunity for use by children who have a variety of abilities;
- Support social interaction and encourage integration;
- Create challenge, not barriers;

- Maintain safety consistent with ASTM standards;
- Be reasonable in terms of cost relative to benefit;
- Allow independent use, as much as possible;
- Address access for parents and care givers;
- Provide access to elevated structures (additional ground level accessible play components may be required, depending on the type of vertical access provided to elevated structures); and
- Provide advisory information in an understandable format to assist designers, operators, and owners, to effectively incorporate access into their designs.

Alternatives Considered

The regulatory negotiation committee considered a number of alternatives for providing accessibility within play areas. The alternatives which were considered and rejected by the regulatory negotiation committee included the following:

- Requiring the entire surface of a play area to be accessible and ramp access to all play components on an elevated structure;
- Requiring the use of transfer systems to reach all of the play components on an elevated structure; and
- Requiring ramp access to a certain height on elevated structures.

Requiring the entire surface of a play area to be accessible and ramp access to all play components on an elevated structure would be too costly. The other alternatives would limit opportunities for children with disabilities to interact and socialize with other children.

Notice of Proposed Rulemaking

The regulatory negotiation committee reached consensus on a proposed set of accessibility guidelines for play areas, which would require a percentage of elevated play components to be accessible and also would provide access to a variety of ground level play components. In March 1998, the Access Board published a Notice of Proposed Rulemaking (NPRM) containing the committee's proposed accessibility guidelines. 63 FR 24080 (April 30, 1998). About 100 public comments were submitted in response to the proposed rule. The comments are summarized and responded to in the preamble to the final guidelines. Based on the public comments, the Access Board has revised some provisions in the final guidelines.

1.4 Statement of Need

Many play areas are designed in such a way that they are not accessible to children with disabilities. Children with disabilities are prevented from getting to, through, and off ground level and elevated play components because there is no accessible ground surface and no means (i.e., ramp or transfer system) to access composite play structures. The lack of accessible routes and other accessible

features limits opportunities for children with disabilities to benefit from the entertainment, education, and socialization opportunities provided by play areas. It also prevents parents and other adults with disabilities who supervise children from using play areas.

Market Failure

Play areas provide both private and public benefits. Among the private benefits are the entertainment and educational value to individual children, the value to parents of having a place to provide these benefits to their children, and the ability of certain businesses such as child care centers and pay-to-play type establishments to sell these amenities. The public benefits associated with play areas largely revolve around the opportunities they provide for children to socialize and develop socialization skills. Of particular importance to these guidelines is the opportunity accessible play areas provide for interaction between children regardless of disability status.

Presumably, the market provides the appropriate number and type of play areas to satisfy the demand for private benefits from play areas. On the other hand, the market does not send clear signals on the public benefits play areas provide. Individuals with disabilities may not have the combined market power to ensure that play areas are designed to be accessible. Since society may not consider these public benefits when making decisions about the design of play areas, society as a whole may face a shortage of the socialization benefits gained through play opportunities. It is this potential shortage that the play area guidelines address.

Civil Rights

Not all government policies are based on maximizing economic efficiency. Even when the market is operating efficiently, there may be groups or individuals who are subject to discriminatory practices and remain "under-served." In these instances, it may be socially desirable to redistribute benefits to those populations that receive less than their "fair" share of goods and services at the market equilibrium. Policies based on furthering the rights of certain classes of individuals provide more equitable distributions of benefits, regardless of the effect on economic efficiency.

The Americans with Disabilities Act is a civil rights law that was enacted by overwhelming bipartisan majorities of Congress and reflects the societal decision to eliminate the various forms of discrimination continually encountered by individuals with disabilities, including the discriminatory effects of architectural barriers. Society relies on political processes to make decisions about redistribution of benefits based on equity considerations – i.e., what is a "fair" share of goods and services. While cost-benefit analysis is not dispositive in making equity-based decisions, it can inform the policy makers as they make redistribution decisions.

CHAPTER 2

DESCRIPTION OF GUIDELINES

2.1 Final Guidelines

Table 2-1 outlines the scoping and technical provisions of the final guidelines. The guidelines only apply to newly designed and newly constructed play areas and existing play areas that are altered.

Table 2-1. Final Guidelines

Section	Requirement
15.6.1 General	
1. Application	1. Newly designed and newly constructed play areas for children ages 2 and over and altered portions of existing play areas must comply with ADAAG 4, except as modified or otherwise provided by 15.6. Where separate play areas are provided within a site for specified age groups, each play area must comply with 15.6. Where play areas are designed or constructed in phases, the section is applied so that when each successive addition is completed, the entire play area complies with 15.6
2. Exception - Family child care facility where proprietor actually resides	2. 15.6 does not apply to play areas located in family child care facilities where proprietor actually resides
3. Exception - Relocation of play components to create safe use zones	3. 15.6 does not apply where play components in existing play areas are relocated to create safe use zones, provided that the surface is not changed or extended more than one use zone
4. Exception - Alterations	4. Where play components are altered and the ground surface is not altered, the ground surface is not required to comply with 15.6.7, unless required by 4.1.6(2)
5. Exception - Amusement attractions	5. 15.6.1 through 15.6.7 do not apply to amusement attractions in amusement or theme parks
6. Exception - Protruding objects	6. Protruding objects are not required to comply with ADAAG 4.4 within boundary of play area
7. Exception - Stairs	7. Stairs are not required to comply with ADAAG 4.9

Section	Requirement
15.6.2 Ground Level Components	
1. General	1. At least one of each type of ground components provided must be on accessible route and comply with 15.6.6
2. Additional number and types	2. Minimum number of ground components must equal at least approximately one-third of elevated components, including a minimum number of types (see Table 15.6.2.2 of guidelines), and must be on accessible route and comply with 15.6.6. Ground components provided to comply with paragraph 1 satisfy paragraph 2
3. Exception - Ramp access	3. Paragraph 2 does not apply if at least 50% of elevated components are connected by a ramp and at least 3 of these elevated components are different types
4. Integration	4. Ground components required by paragraphs 1 and 2 must be integrated in the play area
15.6.3 Elevated Components	
1. Number	1. At least 50% of elevated components must be on an accessible route. Elevated components connected by a ramp must comply with 15.6.6
15.6.4 Accessible Route	
1. General	1. At least one accessible route complying with ADAAG 4.3, as modified by 15.6.4, must be provided
2. Exception - Transfer system	2. Elevated components are permitted to be connected by a transfer system complying with 15.6.5. Where 20 or more elevated components are provided, no more than 25% are permitted to be connected by transfer system
3. Exception - Transfer system and connecting elevated components	3. Where a transfer system is provided, an elevated component is permitted to connect to another elevated component
4. Exception - Platform/wheelchair lifts	4. Platform/wheelchair lifts are permitted
15.6.4.1 Accessible Route - Location	
1. Location	1. At least one accessible route within the boundary of a play area must connect ground and elevated components as required by 15.6.2 and 15.6.3, including entry and exit points
15.6.4.2 Accessible Route - Protrusions	
1. Protrusions	1. Objects must not protrude into ground level accessible routes at or below 80 inches above the surface

Section	Requirement
15.6.4.3 Accessible Route - Clear Width	
1. Ground level routes	1. Ground level accessible routes must be 60 inches minimum clear width
2. Exception - Play areas less than 1,000 square feet	2. Play areas less than 1,000 square feet are permitted to have accessible routes 44 inches minimum clear width, provided that at least one turning space complying with ADAAG 4.2.3 is provided where the restricted accessible route exceeds 30 feet
3. Exception - Reduced width at ground level routes	3. Ground level accessible routes are permitted to be reduced to 36 inches minimum for a distance of 60 inches, provided that multiple reduced width segments are separated by segments 60 inches minimum in length and 60 inches minimum in width
4. Elevated routes	4. Accessible routes connecting elevated components must be 36 inches minimum clear width
5. Exception - Reduced width at elevated routes	5. Elevated accessible routes are permitted to be reduced to 32 inches minimum for a distance of 24 inches maximum, provided that reduced width segments are separated by segments 48 inches minimum in length and 36 inches minimum in width
6. Exception - Transfer systems	6. Transfer systems are permitted to be 24 inches minimum
15.6.4.4 Accessible Route - Ramp Slope and Rise	
1. General	1. Any part of an accessible route with a slope greater than 1:20 is a ramp and must comply with ADAAG 4.8, as modified by 15.6.4.4
2. Ground level	2. Maximum slope for ramps connecting ground components is 1:16
3. Elevated	3. Maximum rise of any ramp run connecting elevated components is 12 inches

Section	Requirement
15.6.4.5 Accessible Route - Handrails	
1. General	1. Where required on ramps, handrails must comply with ADAAG 4.8.5, as modified by 15.6.4.5
2. Exception - Use zones	2. Handrails are not required at ramps located within ground level use zones
3. Exception - Handrail extensions	3. Handrail extensions are not required
4. Gripping surface	4. Handrails must have a diameter or width of 0.95 inches minimum to 1.55 inches maximum, or the shape must provide an equivalent gripping surface
5. Height	5. The top of the handrail gripping surfaces must be 20 inches minimum to 28 inches maximum above a ramp surface
15.6.5 Transfer Systems	
1. General	1. Where transfer systems are provided to connect elevated components, they must comply with 15.6.5
15.6.5.1 Transfer Platforms	
1. General	1. Transfer platforms must be provided where transfer is intended to be from a wheelchair or other mobility device
2. Size	2. Platforms must have a level surface 14 inches minimum in depth and 24 inches minimum in width
3. Height	3. Platform surfaces must be 11 inches minimum to 18 inches maximum above the ground or floor surface
4. Transfer space	4. A level space complying with ADAAG 4.2.4 must be centered on the 48 inch long dimension parallel to the 24 inch minimum long unobstructed side of the platform
5. Transfer supports	5. A means of support for transferring must be provided
15.6.5.2 Transfer Steps	
1. General	1. Transfer steps must be provided where movement is intended from a transfer platform to a level with elevated components required to be located on an accessible route
2. Size	2. Steps must have a level surface 14 inches minimum in depth and 24 inches minimum in width
3. Height	3. Each step must be 8 inches maximum in height
4. Transfer supports	4. A means of support for transferring must be provided

Section	Requirement
16.6.6 Play Components	
1. General	1. Ground components located on an accessible route and elevated components connected by a ramp must comply with 15.6.6
2. Maneuvering space	2. Maneuvering space complying with ADAAG 4.2.3 must be provided on the same level as the components and not have a slope steeper than 1:48 in all directions. For swings, the space must be located immediately adjacent to the swing
3. Clear floor or ground space	3. Clear floor or ground space must be provided at the components, be 30 x 40 inches minimum, and not have the slope steeper than 1:48 in all directions
4. Play table height and clearances	4. Play tables must provide knee clearance 24 inches high minimum, 17 inches deep minimum, and 30 inches wide minimum. Tops of rims, curbs, or other obstructions must be 31 inches high maximum
5. Exception - Play tables for children age five and younger	5. Play tables primarily for children age five and younger are not required to provide knee clearance if the clear floor or ground space is arranged for a parallel approach and if the rim surface is 31 inches high maximum
6. Entry point and seat heights	6. When transfer is required to the entry point or seat, the entry point or seat must be 11 inches minimum and 24 inches maximum above the clear ground or floor space
7. Exception - Slide entry points	7. Slide entry points are not required to comply
8. Transfer supports	8. A means of support for transferring must be provided when transfer to entry point or seat is required
15.6.7 Ground Surfaces	
1. General	1. Ground surfaces along accessible routes, clear floor or ground spaces, and maneuvering spaces within play areas must comply with ADAAG 4.5.1 and 15.6.7
2. Accessibility	2. Ground surfaces must comply with ASTM F 1951-99 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment. Ground surfaces must be inspected and maintained regularly and frequently to ensure continued compliance with ASTM F 1951-99
3. Use zones	3. Ground surfaces within use zones must comply with ASTM F 1292-96 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment

Section	Requirement
15.6.8 Soft Contained Play Structures	
1. Structure with three or fewer entry points	1. At least one entry point must be located on an accessible route
2. Structure with four or more entry points	2. At least two entry points must be located on an accessible route
3. Exception - Transfer systems and platform/wheelchair lifts	3. Transfer systems complying with 15.6.5 and platform/wheelchair lifts complying with ADAAG 4.11 and applicable State or local codes are permitted

2.2 Changes from Proposed Rule

Based on public comments in response to the proposed rule, the Access Board has modified several provisions in the final guidelines that will reduce the cost of the guidelines. Table 2-2 outlines these changes between the proposed rule and final guidelines.

A provision has been added to the final guidelines to provide that where play areas are designed or constructed in phases, the guidelines are to be applied so that when each successive addition is completed, the entire play area complies with the guidelines. Another provision has been added to provide that ground surfaces along accessible routes, clear floor or ground spaces, and maneuvering spaces be inspected and maintained regularly and frequently to ensure continued compliance with the ASTM F 1951-99 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment. The costs of this provision is further examined in Chapter 4.

Other provisions in the final guidelines have been revised and reorganized for greater clarity, but those changes will not generally affect the cost and are not included in Table 2-2.

Table 2-2. Changes Between Proposed Rule and Final Guidelines

Final Guidelines	Proposed Rule
15.6 does not apply to play areas located in family child care facilities where the proprietor actually resides	No exception
Where play components are altered and the ground surface is not altered, the ground surface is not required to comply with 15.6.7, unless required by 4.1.6(2).	No exception
15.6.1 through 15.6.7 do not apply to amusement attractions in amusement or theme parks	No exception
Stairs are not required to comply with ADAAG 4.9	No exception

Final Guidelines	Proposed Rule
Where elevated components are provided, minimum number of ground components provided must equal at least approximately one-third of the elevated components, including a minimum number of types. See Table 15.6.2.2 of guidelines. These ground level components must be on an accessible route and comply with 15.6.6	Where elevated components are provided, minimum number of ground components provided must equal at least one-half of the elevated components. These ground level components must be on an accessible route and comply with comparable technical provisions
If at least 50% of elevated components are connected by a ramp and at least 3 of these elevated components are different types, minimum number of ground level components (see above) are not required	If 100% of elevated components are connected by a ramp, minimum number of ground level components (see above) are not required
Accessible routes connecting elevated components are not required to comply with provision requiring objects not to protrude into accessible routes at or below 80 inches above the surface	No exception
Transfer systems connecting elevated play components are permitted to be 24 inches minimum clear width	No exception
Handrail extensions are not required	No exception
Reach ranges included as advisory information in the appendix. Knee clearance and height for play tables included in guidelines	Reach ranges included in guidelines

CHAPTER 3

NUMBER AND SIZE OF PLAY AREAS AFFECTED BY GUIDELINES

3.1 Overview

In order to assess the impact of the guidelines, we need to know how many play areas are likely to be constructed or replaced in the absence of the guidelines. We first estimate the number of existing establishments that are likely to have play areas as a part of the services they provide. We then estimate how many of these existing establishments are likely to replace their play areas each year. We also estimate the number of new establishments with play areas that are likely to be constructed in the year 2000. Because the incremental costs of complying with these guidelines will vary by the size of the play area, we also estimate the size of the new and replaced play areas at each type of establishment.

We have identified 10 major business and government categories that may have play areas.[3] The methodology for estimating the number of new and replaced play areas varies by category depending on the type of data available. The general methodology requires identifying the number of establishments potentially affected by the guidelines in each category. The Small Business Administration (SBA) is the primary source of data on the number of establishments in each category.[4] An establishment is defined as a single physical location where business is conducted or where services or industrial operations are performed. Each category is identified by its standard industrial classification code (SIC code) as defined by the Office of Management and Budget. The most recent historical data available from the SBA on the Statistics of U.S. Businesses are for the years 1988 through 1996. Because the SBA data is only current through 1996, we use the historical growth in the number of establishments in each SIC code to estimate the number of establishments in operation during 1999. The historical growth trends for each SIC code were also used to estimate how many new establishments are expected to be constructed in the year 2000.

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[3] Apartment buildings, mobile home parks, rooming houses, and other private dwellings are not included in this assessment because they are not covered by the Americans with Disabilities Act. Amusement and theme parks also are not included in this assessment because the final guidelines exempt amusement attractions in those facilities from the play area guidelines, except for soft contained play structures. The guidelines are not expected to result in additional costs for soft contained play structures and, therefore, those play areas are not considered in this chapter.

[4] This assessment uses information from the static firm size data set. The static data presents a "snapshot" of each business category at a specific point in time, typically March of a given year. As a result, the data set includes establishments with zero employment in March, while annual payroll is recorded for the entire year. New firms and seasonal employment are included in this data set and show up in the zero employment size category. Information from the dynamic data set, which excludes establishments with zero employment in March, is not representative for purposes of this assessment.

We used an alternative methodology to estimate the number of recreational vehicle parks and campsites, public and private schools, child care centers, and municipal and state parks. Using SIC code data was not appropriate for those categories because more recent data was available or because SIC data does not exist for these categories. We do not expect that the use of multiple data sets will affect the quality of the assessment because the categories are largely independent of each other.

The definitions of some SIC codes include a variety of business operations that may or may not have play areas. For example, the eating places SIC code includes business operations that range from fast-food establishments to fine dining establishments. Obviously not all of these eating places are likely to have play areas. Therefore, the proportion of play areas at existing establishments within each SIC code is estimated. The assumptions applied to estimate these proportions are described for each category. The same assumptions are applied to estimate how many new establishments with play areas will be constructed.

Since the guidelines apply only to new construction and alterations, the number of existing establishments with play areas does not represent the annual number of play areas affected by the guidelines. Instead, some of these existing play areas are replaced each year and then become subject to the guidelines. The annual number of replaced play areas is estimated using the expected replacement rate for existing play areas. Since we have not found data on the play area replacement rate, we make assumptions about the rate. There are two natural times to replace a play area: when the entire facility is upgraded or renovated, or when the play equipment physically wears out. Business and government sectors vary in their average turnover or renovation rates; restaurants may remodel every few years, while parks are rarely redesigned. If renovations of the entire facility is the best measure of the play area replacement rate, an average replacement rate across all sectors would be approximately 10 years. The alternative approach is based on the typical warranty period of play equipment, which represents the expected useful life of an existing play area. Based on warranty information gathered from manufacturers' catalogues, the typical useful life of play equipment is 25 years. To represent this range of values, we assume an annual replacement rate of 15 years or 6.67 percent for existing play areas.

Table 3-1 shows the estimated number of existing establishments with play areas in 1999. Table 3-2 shows the estimated number and size of existing play areas expected to be replaced annually. The specific methodologies and assumptions used to estimate the numbers for each category are discussed in the next section.

Table 3-1. Existing Establishments with Play Areas

SIC	Category	Existing Establishments in 1999	Percent with Play Areas		Number of Play Areas	
			Low	High	Low	High
5812	Eating Places	420,000	2	5	8,400	21,000
7011	Hotels & Motels	47,000	2	5	940	2,300
7032	Sporting & Recreational Camps	3,600	10	25	360	900
7033	Recreational Vehicle Parks & Campsites	7,000	40	60	2,800	4,200
7999	Miscellaneous Amusement & Recreation	32,000	10	25	3,200	8,000
n/a	Public Schools	65,000	80	100	52,000	65,000
n/a	Private Nonsectarian Schools	5,500	80	100	4,400	5,500
8351	Child Day Care Services	102,000	90	100	92,000	102,000
8641	Civic, Social, & Fraternal Associations	37,000	2	5	740	1,900
n/a	Municipal & State Parks	111,000	30	60	33,000	67,000
	Total	**830,000**			**200,000**	**280,000**

Note: Totals may not add due to rounding.

Table 3-3. Number & Size of Existing Play Areas Replaced Annually

SIC	Category	Small		Medium		Large		Total	
		Low	High	Low	High	Low	High	Low	High
5812	Eating Places	560	1,400	-	-	-	-	**560**	**1,400**
7011	Hotels & Motels	50	125	12	31	-	-	**60**	**160**
7032	Sporting & Recreational Camps	5	12	19	48	-	-	**25**	**60**
7033	Recreational Vehicle Parks & Campsites	150	224	37	56	-	-	**190**	**280**
7999	Miscellaneous Amusement & Recreation	106	265	106	265	-	-	**210**	**530**
n/a	Public Schools	700	870	2,400	3,000	350	430	**3,450**	**4,300**
n/a	Private Nonsectarian Schools	60	70	200	260	29	37	**290**	**370**
8351	Child Day Care Services	3,700	4,100	1,800	2,000	620	680	**6,100**	**6,800**
8641	Civic, Social, & Fraternal Associations	40	100	10	20	-	-	**50**	**120**
n/a	Municipal and State Parks	-	-	440	890	1,760	3,575	**2,200**	**4,470**
	Total	**5,400**	**7,200**	**5,100**	**6,700**	**2,800**	**4,700**	**13,300**	**18,600**

Note: Totals may not add due to rounding.

Table 3-3 shows the estimated number of new establishments with play areas that are expected to be constructed in the year 2000. Table 3-4 shows the estimated size of these newly constructed play areas. The specific methodologies and assumptions used to estimate the numbers for each category are discussed in the next section.

Table 3-3. Newly Constructed Establishments with Play Areas

SIC	Category	New Establishments in 2000	Percent with Play Areas		Number of Play Areas	
			Low	High	Low	High
5812	Eating Places	14,700	2	5	300	740
7011	Hotels & Motels	700	2	5	15	35
7032	Sporting & Recreational Camps	100	10	25	10	25
7033	Recreational Vehicle Parks & Campsites	170	40	60	70	100
7099	Miscellaneous Amusement & Recreation	1,500	10	25	150	380
n/a	Public Schools	400	80	100	320	400
n/a	Private Nonsectarian Schools	40	80	100	30	40
8351	Child Day Care Services	3,500	90	100	3,150	3,500
8641	Civic, Social, & Fraternal Associations	-	-	-	-	-
n/a	Municipal & State Parks	200	30	60	60	120
	Total	**21,000**			**4,100**	**5,300**

Note: Totals may not add due to rounding.

Table 4-4. Number & Size of Newly Constructed Play Areas

SIC	Category	Small		Medium		Large		Total	
		Low	High	Low	High	Low	High	Low	High
5812	Eating Places	300	740	-	-	-	-	**300**	**740**
7011	Hotels & Motels	11	28	3	7	-	-	**15**	**35**
7032	Sporting & Recreational Camps	2	5	8	20	-	-	**10**	**25**
7033	Recreational Vehicle Parks & Campsites	55	83	14	21	-	-	**70**	**100**
7999	Miscellaneous Amusement & Recreation	77	190	77	190	-	-	**150**	**380**
n/a	Public Elementary & Middle Schools	65	81	224	280	32	40	**320**	**400**
n/a	Private Elementary and & Middle Schools		8	23	29	3	4	**30**	**40**
8351	Child Day Care Services	1,900	2,100	940	1,050	310	350	**3,150**	**3,500**
8641	Civic, Social, & Fraternal Associations	-	-	-	-	-	-	-	-
n/a	Municipal & State Parks			12	24	48	96	**60**	**120**
	Total	**2,400**	**3,200**	**1,300**	**1,600**	**400**	**490**	**4,100**	**5,300**

Note: Totals may not add due to rounding.

3.2Number and Size of New and Replaced Play Areas

3.2.1 Eating Places

This category (SIC code 5812) includes establishments primarily engaged in the retail sale of prepared food and drink for on-premise or immediate consumption. Based on historical data from the Bureau of Census, this category averaged 4.7 percent growth annually between 1990 and 1996. The estimated number of eating places in 1999 is 420,000; and the projected number of new establishments in the year 2000 is 14,700.

How many existing eating places are likely to have play areas?

We assume that eating places which cater to families with young children are likely to have some type of play area for customers. Some fast food restaurants have indoor soft contained play structures. Research prepared by the Consumer Product Safety Commission found that approximately 7,000 fast food restaurants nationwide have soft contained play structures.[5] Casual observation indicates that, while soft contained play structures represent a significant proportion of the play areas in eating places, they do not represent the entire universe. Some "family style" restaurants provide play areas for children in an outdoor setting as well. We estimate that the number of existing eating places that provide play areas, other than soft contained play structures, ranges between 2 percent and 5 percent, yielding 8,400 to 21,000 existing play areas. Based on the assumed replacement rate, we estimate that 560 to 1,400 existing play areas will be replaced annually at eating places. Because the space for serving food to customers will be valued a higher rate than space for a play area, we assume the play areas are small.

How many new eating places with play areas will to be constructed?

The proportion of new eating places with play areas is expected to be the same as assumed for existing establishments. We estimate that approximately 300 to 740 new eating places with play areas will be constructed in the year 2000, and that the play areas will be small.

3.2.2 Hotels and Motels

This category (SIC code 7011) includes commercial establishments commonly known as hotels, motor hotels, motels, and tourist courts, primarily engaged in providing lodging, or lodging and meals, to the general public. Based on historical data from the Bureau of Census, this category experienced a moderate growth rate between 1990 and 1996. The estimated number of hotels and motels in 1999 is 47,000; and the projected number of new establishments in the year 2000 is 700.

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[5] Consumer Product Safety Commission, *Soft Contained Playground Equipment Report*, March 1996.

How many existing hotels and motels are likely to have play areas?

We assume that hotels and motels which advertise themselves as family lodging are most likely to have play areas. We estimate that the number of existing hotels and motels with play areas ranges between 2 percent and 5 percent, yielding 940 to 2,300 existing play areas. This may underestimate the number of existing hotel and motels with play areas. Based on the assumed replacement rate, we estimate that 60 to 160 existing play areas will be replaced annually at hotels and motels. Because play areas are amenities valued by a relative minority of hotel and motel customers, we assume that 80 percent are small, and 20 percent are medium. There are exceptions to this assumption such as areas like Orlando, Florida with tourist attractions that target young children.

How many new hotels and motels with play areas will be constructed?

The proportion of new hotels and motels with play areas is expected to be the same as assumed for existing establishments. We estimate that approximately 15 to 35 new hotels and motels with play areas will be constructed in the year 2000, and that 80 percent will be small and 20 percent will be medium.

3.2.3 Sporting and Recreational Camps

These establishments (SIC code 7032) are primarily engaged in operating boys and girls camps, scout camps, and fishing and hunting camps. Based on historical data from the Bureau of Census, this category experienced a moderate growth rate between 1990 and 1996. The estimated number of sporting and recreational camps in 1999 is 3,600; and the projected number of new establishments in the year 2000 is 100.

How many existing sporting and recreational camps are likely to have play areas?

The sporting and recreation camps category includes a variety of establishments and is not exclusive to camps providing services to young children. We estimate that 10 percent to 25 percent of the existing establishments are likely to have play areas, yielding 360 to 900 existing play areas. Based on the assumed replacement rate, we estimate that 25 to 60 existing play areas are replaced annually at sporting and recreational camps. The size distribution of these existing play areas is assumed to be driven by the age of the camp participants. We assume that 80 percent are medium, and 20 percent are small.

How many new sporting and recreational camps with play areas will be constructed?

The proportion of new sporting and recreational camps with play areas is expected to be same as assumed for existing establishments. We estimate that approximately 10 to 25 new sporting and recreational camps with play areas will be constructed in the year 2000; and that 80 percent will be medium and 20 percent will be small.

3.2.4 Recreation Vehicle Parks and Campsites

These establishments (SIC code 7033) are primarily engaged in providing temporary space for parking recreational vehicles or setting up tents. Based on data compiled by Woodall's Publication Corp., a service that publishes an annual directory of campgrounds that include recreational vehicle parks, approximately 7,000 privately-owned sites were in operation during 1999.[6] The growth since the early 1990's in the recreational vehicle park and campsite sector has been moderate. Based on historical growth, the projected number of new establishments in the year 2000 is 170.

How many existing recreational vehicle parks and campsites are likely to have play areas?

Recreational vehicle parks and campsites range from very simple and rustic with few amenities to luxurious settings with swimming pools, arcades, and play areas. The Woodall directory includes a quality rating for the sites and the amenities they provide, including play areas. Over 54 percent of the sites have playgrounds or play equipment. The Woodall's directory defines playgrounds as having commercial and/or durable quality play equipment, and there must be at least three types of play equipment or extensive quantities of any one particular type. Play equipment is anything less than playgrounds (i.e., the items are of lesser quality or do not meet the quantity requirement). This suggests that fewer than 54 percent of existing facilities may have play areas that would be covered by the guidelines. We estimate that the number of existing sites that have play areas ranges between 40 and 60 percent, yielding 2,800 to 4,200 existing play areas. Based on the assumed replacement rate, we estimate that 190 to 280 existing play areas will be replaced annually at recreational vehicle parks and campsites. We assume that 80 percent are small, and 20 percent are medium.

How many new recreational vehicle parks and campsites with play areas will be constructed?

The proportion of new recreational vehicle parks and campsites with play areas is expected to be the same as assumed for existing establishments. We estimate that approximately 70 to 100 new recreational vehicle parks and campsites with play areas will be constructed in the year 2000, and that 80 percent will be small and 20 percent will be medium.

3.2.5 Miscellaneous Amusement and Recreation

This category (SIC code 7996) includes day camps, picnic grounds, and other private amusement and recreation services not classified elsewhere. Based on historical data from the Bureau of Census, this category has averaged 8 percent growth annually between 1990 and 1996. The estimated number of miscellaneous amusement and recreation establishments in 1999 is 32,000; and the projected number of new establishments in the year 2000 is 1,500.

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[6] Woodall Publication Corp., *Woodall's 1999 North American Campground Directory*, Lake Forrest, Illinois, http://www.woodalls.com.

How many existing miscellaneous amusement and recreation establishments are likely to have play areas?

The miscellaneous amusement and recreation category includes a variety of establishments that may or may not have play areas. The establishments most likely to have play areas are day camps and picnic ground operations. No data is available to determine precisely how many of these existing establishments have play areas. We assume that 10 percent to 25 percent of the existing establishments have play areas, yielding 3,200 to 8,000 existing play areas. Based on the assumed replacement rate, we estimate that 210 to 530 play areas will be replaced annually at miscellaneous amusement and recreation establishments. Because these establishments are engaged in providing a service that typically attracts young children, we assume that 50 percent are large, and 50 percent are medium.

How many new miscellaneous amusement and recreation establishments with play areas will be constructed?

The proportion of new miscellaneous amusement and recreation establishments with play areas is expected to be same as assumed for existing establishments. We estimate that approximately 150 to 380 new miscellaneous amusement and recreation establishments with play areas will be constructed in the year 2000, and that 50 percent will be large and 50 percent will be medium.

3.2.6 Public Schools

The number of facilities in this category is the total number of public schools, excluding those that are strictly secondary schools. Based on data collected by the Department of Education's National Center for Education Statistics (NCES), 63,961 public elementary schools were in operation in 1995-96.[7] This figure includes middle schools beginning with grade 6 or below and with no grade higher than 8; and combined elementary and secondary schools beginning with grade 6 or below and ending with grade 9 or above. Based on projections developed by the NCES and reports on school construction, it is estimated that an average of 167 public elementary schools were constructed every year up to 1999, and that approximately 65,000 public elementary schools were in operation in 1999.

How many existing public schools are likely to have play areas?

The NCES does not collect data on how many public schools have play areas. Since public elementary schools provide educational services to children ages 5 through 12, they are the most likely to have play areas. We estimate that the number of existing public elementary schools with play areas ranges between 80 percent and 100 percent, yielding 52,000 to 65,000 existing play areas.

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[7] National Center for Education Statistics, *The Digest of Education Statistics 1997*, Table 89 -Public School Districts and Public and Private Elementary and Secondary Schools: 1929-30 to 1995-96. http://nces.ed.gov/pubs/Digest97 Accessed 10/20/1999.

Several school districts were contacted for the purpose of verifying our assumptions. The results of the inquiry should not be interpreted as representing a scientific or statistically valid sampling of public schools. However, to take a cross-section of school districts, we selected three each from rural, suburban, and urban areas. Each school district contacted was asked to provide the number of elementary and middle schools in the school district and the number of play areas in the district school system. Districts with relatively few schools, typically rural and suburban, easily provided this information. However, inquiries at districts with a significant level of facility infrastructure, such as Atlanta and San Diego, required the attention of their facility management staff. The staff members contacted had good general knowledge of the facilities, but due to the size of the systems, they generally referred to a facility maintenance report to determine the number of schools with play areas. Many of these schools are currently upgrading existing play areas to meet the safety and surfacing recommendations developed by the Consumer Product Safety Commission and the ASTM F1487-98 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.

Table 3-5 presents the results of this inquiry of existing public schools. We believe that the findings of this inquiry reasonably support the assumptions we applied to this category.

Table 3-5. Public School Play Areas

State	District Name	Schools *	Play Areas	Percent
	Rural			
GA	Washington County School System	5	4	80
NY	Oneonta City School District	4	4	100
CA	Orland Unified School District	3	2	67
	Subtotal	**12**	**10**	**83**
	Suburban			
GA	Douglas County School System	22	22	100
NY	South Colonie School District	7	7	100
CA	Cajon Valley Union Schools	27	27	100
	Subtotal	**56**	**56**	**100**
	Urban			
GA	Atlanta Public Schools	86	40	47
OH	Cleveland Municipal School District	105	75	71
CA	San Diego Unified Schools District	149	149	100
	Subtotal	**340**	**264**	**77.65**
	Total	**408**	**330**	**80.88**

* Elementary and middle schools

Based on the assumed replacement rate, we estimate that approximately 3,450 to 4,300 existing play areas will be replaced annually at public schools. We assume that 20 percent are small, 70 percent are medium, and 10 percent are large. These assumptions are based on industry observations and marketing materials targeting public schools.

How many new public schools with play areas will be constructed?

The construction of new public schools is driven by two factors, growth in student population and the integrity of existing structures. Based on data from the NCES, enrollment in public elementary and middle schools is expected to increase by approximately 3.4 million students between 1995 and 2007.[8] According to the 1999 School Planning and Management Construction Report,[9] which is based on a 100 percent census of public school districts in the United States, the national median design number of students for new public elementary and middle schools is 700 per school (600 in elementary and 800 in middle). Dividing enrollment data by the median student population of a new public elementary and middle school, we estimate that 4,857 new public elementary and middle schools will be constructed between 1995 and 2007. Assuming that an equal proportion are built each year during this period, approximately 400 new public elementary and middle schools will be constructed in the year 2000.

The construction budget for new public schools rarely includes play areas. Play areas usually are added after construction by the local Parent -Teacher Association (PTA). The National PTA has no information on the play areas their local organizations may sponsor through fund raising efforts because they operate independently from the national headquarters. We assume that the proportion of new public elementary and middle schools with play areas is expected to be the same as for existing public schools. Based on the estimated number of new public elementary and middle schools constructed, we estimate the number of new public schools with play areas ranges from 320 to 400 annually in the year 2000. The size distribution is assumed to be the same as for existing public schools.

3.2.7 Private Schools

The number of facilities in this category (SIC code 8211) is the total number of private schools, excluding those that are strictly secondary institutions. Only nonsectarian schools are included because religious establishments are not covered by title III of the Americans with Disabilities Act (42 U.S.C. 12187). Based on data collected by the NCES, 23,542 private elementary schools were in operation in 1993-94, of which 4,785 were nonsectarian.[10] This figure includes middle schools beginning with grade 6 or below, and with no grade higher than 8, and combined elementary and secondary schools beginning with grade 6 or below and ending with grade 9 or above. Based on historical data projections developed from the most recent survey of private schools, we estimate that

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[8] National Center for Education Statistics, *Projection of Education Statistics to 2007*, Chapter 1: Elementary and Secondary Enrollment, 1997. http://nces.ed.gov/pubs/pj Accessed 10/20/1999.

[9] Abramson, Paul. 1999 School Planning & Management Construction Report, *School Planning & Management*. http://www.spmmag.com/construction/Construction_1999 Accessed 6/28/1999.

[10] National Center for Education Statistics, *The Digest of Education Statistics 1997*, Table 62 -Private Elementary and Secondary Enrollment and Schools: 1993-94. http://nces.ed.gov/pubs/Digest97 Accessed 10/20/1999.

an additional 41 private nonsectarian elementary schools were added every year. We estimate there were approximately 5,500 private nonsectarian elementary schools in 1999.

How many existing private nonsectarian schools are likely to have play areas?

We assume that the assumptions applied to public schools are valid for private nonsectarian schools, due to the limited data available. We estimate the number of existing private nonsectarian schools with play areas ranges from 4,400 to 5,500. Based on the assumed replacement rate, we estimate that 290 to 370 play areas will be replaced annually at private nonsectarian schools. We assume 20 percent are small, 70 percent are medium, and 10 percent are large.

How many new private nonsectarian schools with play areas will be constructed?

Based on data from the NCES, enrollment in private elementary and middle schools is projected to increase by approximately 0.4 million students between 1995 and 2007.[11] During this period the proportion of students enrolled in private nonsectarian schools was relatively consistent, ranging between 16 and 17 percent of the total private school enrollment. Therefore, of the 0.4 million new students, we estimate that 5,500 of these students will enroll in private nonsectarian schools. Observing a downward trend in the average number of students per private nonsectarian school, we estimate that on average approximately 40 new private nonsectarian schools will be constructed each year.

We assume that the proportion of new private nonsectarian schools with play areas is expected to be the same as for existing private nonsectarian schools. Based on the estimated number of new private nonsectarian schools constructed, we estimate the number of new private nonsectarian schools with play areas ranges from 30 to 40 in the year 2000. The size distribution is assumed to be the same as for existing private nonsectarian schools.

3.2.8 Child Day Care Services

This category (SIC code 8351) includes establishments that care for infants or children, or provide prekindergarten education. These establishments typically care for preschool age children, but may care for older children when they are not in school.[12]

The Children's Foundation conducts an annual survey of the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands which regulate child care centers through "licensure" or registration. The Children's Foundation defines a child care center for the purposes of the survey

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[11] National Center for Education Statistics, *Projection of Education Statistics to 2007*, Chapter 1: Elementary and Secondary Enrollment, 1997. http://nces.ed.gov/pubs/pj Accessed 6/28/1999.

[12] The final guidelines exempt family, home-based, child care facilities and, therefore, those facilities are not included in this assessment.

as a full or part-time care facility for groups of children in a non-residential setting. Licensing is defined as the granting of formal permission by a designated state or local agency to an individual or legal entity to operate a child care center. The state or local agency has the authority to ensure that health and safety standards are being met, set procedures for revoking a license, and provide appeal mechanisms. The purpose of licensing is to protect vulnerable consumers by setting a minimum floor for reasonably safe service. However, there is no uniform way in which the states regulate child care centers, preschools, nursery schools, and prekindergarten programs.

The *1999 Child Care Center Licensing Study* reports that 102,458 regulated child care centers existed during the survey period of October 1998 through January 1999.[13] This data is limited by the fact that not all states report data consistently. Thus, the 1999 survey includes some data reported for 1998 (New Mexico). It should also be noted that child care centers affiliated with a religious institution are not covered by title III of the Americans with Disabilities Act (42 U.S.C. 12187). Using this data overestimates the number of child care facilities potentially affected by the guidelines since the survey includes sectarian institutions. This overestimation may be partially counterbalanced by the fact that some states exempt religiously affiliated child care centers from licensing and they would not be included in the survey. The survey may also overstate the number of child care centers affected by the guidelines due to the inclusion of infant care centers serving children from birth to one year, and up to 18 months in some states.

How many existing child care centers are likely to have play areas?

The Children's Foundation does not collect data on how many existing child care centers have play areas. Since child care centers provide services to preschool age children and older children when they are not in school, we assume the proportion of existing child care centers with play areas ranges between 80 percent and 100 percent, yielding 92,000 to 102,000 existing play areas. We estimate that 60 percent are small, 30 percent are medium, and 10 percent are large. Based on the assumed replacement rate, we estimate that approximately 6,100 to 6,800 of existing play areas will be replaced annually at child care centers.

How many new child care centers with play areas will be constructed?

Data collected by the Children's Foundation for 1999 indicates a 3.4 percent increase in the number of child care centers over 1998. If this rate of growth continues, approximately 3,500 new child care centers will be constructed in the year 2000. We assume that the proportion of new child care centers with play areas is expected to be the same as for existing child care centers. We estimate the number of new child care centers with play areas ranges from 3,150 to 3,500 in the year 2000. The size distribution is estimated to be the same as for existing child care centers.

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[13] The Children's Foundation, *1999 Child Care Center Licensing Study*, Washington, D.C.

3.2.9 Civic, Social, and Fraternal Associations

This category (SIC code 8641) includes organizations such as the YMCA and Boys and Girls Clubs, which are likely to have play areas. However, the category also includes booster clubs, citizen unions, university clubs, tenant associations, and others that are not likely to have play areas. Based on historical data from the Bureau of Census, we estimate 37,000 civic, social, and fraternal organizations will be in operation during 1999.

How many existing civic, social, and fraternal associations are likely to have play areas?

In addition to the YMCA and Boys and Girls Clubs, civic, social, and fraternal associations that serve as a center for community gatherings, such as a Moose Lodge or American Legion, may have play areas. However, due to the breadth of establishments covered by this category and their tendency to be more adult oriented, we assume that the majority do not have play areas. We estimate the number of existing civic, social, and fraternal associations with play areas ranges from 2 percent to 5 percent, yielding 740 to 1,900 existing play areas. Based on the assumed replacement rate, we estimate that 50 to120 existing play areas will be replaced annually at civic, social, and fraternal associations. We assume that 80 percent are small and 20 percent are medium, since most of the establishments are not created to serve children and play areas are installed as a secondary response to family activities centered at the establishment.

How many new civic, social, and fraternal association facilities with play areas will be constructed?

The historical data for civic, social, and fraternal associations indicates a downward trend in the number of new establishments. Therefore, we do not expect that any new facilities with play areas will be constructed by these establishments.

3.2.10 Municipal and State Parks

Parks are provided as a public good by State, county, and municipal governments. The majority of public parks are provided free of charge. However, at certain state parks users may have to pay some type of entrance fee. In 1986, the National Association of State Outdoor Recreation Liaison Officers conducted a survey of the number and types of state, regional, county, and municipal recreation areas. These areas include parks, forests, wildlife preserves, and other types of recreational areas. This 50-state survey found approximately 108,000 recreational areas in 1986.[14] Using their best professional judgement, officials at the National Recreation and Park Association (NRPA) updated the 1986 data and estimated the number of recreation areas to have increased slightly to 111,000 in 1999.

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[14] National Association of State Outdoor Recreation Liaison Officers. Estimates by each State are based on 50 Statewide Comprehensive Outdoor Recreation Plans. Data compiled by Bureau of Planning, Green Acres Program, New Jersey Department of Environmental Protection, April, 1986.

How many municipal and state parks are likely to have play areas?

The NRPA data includes recreation areas that are likely to have play areas (e.g., parks) and recreation areas that are less likely to have play areas (e.g., wildlife reserves). The number of existing play areas in these recreation areas was estimated by reviewing state parks and recreation websites that have play areas on the selection criterion for searches.[15] Based on this review, we estimate the number of existing recreation areas with play areas ranges from 30 percent to 60 percent, yielding 33,000 to 67,000 existing play areas at municipal and state parks. Based on the assumed replacement rate, we estimate that 2,200 to 4,470 existing play areas will be replaced annually at municipal and state parks. We assume that 80 percent are large and 20 percent are medium.

How many new municipal and state parks with play areas will be constructed?

To estimate the number of newly constructed municipal and state parks, we divided the estimated increase in the number of recreation areas from 1986 to 1999 (3,000 areas) by the number of years (13 years), which yields approximately 200 newly constructed recreation areas per year. We assume that the proportion of newly constructed parks with play areas is the same as for existing parks. We estimate that the number of new municipal and state parks with play areas ranges from 60 to 120 in the year 2000. The size distribution is estimated to be the same as for existing parks.

[15] Colorado Department of Natural Resources, http://www.dnr.state.co.us/parks. Accessed 11/3/1999. New York State Office of Parks, Recreation and Historical Preservation. http://nysparks.state.ny.us Accessed 11/3/1999.

CHAPTER 4

COST OF GUIDELINES

4.1 Overview

This chapter

- Discusses the factors considered in establishing a baseline for the design of play areas against which the incremental costs of the guidelines are estimated;
- Describes three model play areas chosen to represent the different sizes and costs of play areas;
- Estimates the incremental equipment and ground surface costs for designing the model play areas to comply with the guidelines, compared to the baseline;
- Estimates the incremental maintenance costs (savings) for two surfacing options for the model play areas;
- Calculates the full incremental costs of the guidelines for the model play areas; and
- Aggregates the social and direct costs of the guidelines to arrive at a total annual cost.

4.2 Baseline

To estimate the incremental costs of the guidelines, it is necessary to establish a baseline against which the cost of play areas designed in accordance with the guidelines can be compared. The baseline is a reasonable forecast of how play areas would be designed in the absence of the guidelines. The following factors were considered in establishing the baseline: evolution of industry standards; civil rights laws and regulations guaranteeing the rights of individuals with disabilities; and degree of compliance by covered entities with those civil rights laws and regulations.

Evolution of Industry Standards

Beginning in 1990, the American Society of Testing and Materials (ASTM) established several subcommittees to develop voluntary standards for play areas. The ASTM F 15.29 Public Playground Equipment Subcommittee issued the ASTM F 1487 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use initially in 1993 and revised the standard in 1995 and 1998. Although the ASTM F 1487 standard is primarily concerned with safety, the ASTM subcommittee which developed the standard included technical provisions in the standard for accessible routes, ramps, transfer systems, and ground level play components based on the

understanding that the Americans with Disabilities Act applied to play areas. The technical provisions of the play area accessibility guidelines are consistent with the ASTM F 1487 standard. The ASTM F 1487 standard does not include scoping provisions specifying how many ground level and elevated play components are to be accessible.

The ASTM F08.63 Playground Surfacing Systems Subcommittee issued the ASTM PS 83 Provisional Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment in 1997. A final standard, ASTM F 1951 Standard Specification for Determination of Accessibility of Surface System Under and Around Playground Equipment, was issued in 1999. The ASTM F 1951 standard provides an objective way to measure the accessibility of ground surface materials commonly used in play areas. The play area accessibility guidelines reference the ASTM F 1951 standard. Some engineered wood fiber surfaces if installed and maintained properly, and rubber surfaces meet the ASTM F 1951 standard. There may be other surfaces that meet the ASTM F 1951 standard.

The ASTM F 15.36 Soft Contained Play Equipment Subcommittee issued the ASTM F 1918 Standard Safety Performance Specification for Soft Contained Play Equipment in 1998. The ASTM F 1918 standard includes technical provisions for transfer platforms to entry points of soft contained play equipment, which are consistent with the play areas accessibility guidelines.

Although these ASTM standards are voluntary, many operators of play areas specify that the equipment meet the ASTM standards when purchasing the equipment for safety reasons and manufacturers tend to follow the ASTM standards. It is common today for play equipment manufacturers to incorporate as a standard feature a transfer system to at least one deck or level on composite play structures and to provide an activity panel or slide on that deck. Operators of play areas can provide more or less accessible features based on individual considerations.

Legal liability and insurance costs could cause operators of play areas to upgrade their play areas to comply with the ASTM standards sooner than they would have following an ordinary replacement schedule. The ATSM standards have not been in place long enough to ascertain the extent to which this has occurred.

Civil Rights Laws and Regulations

The Americans with Disabilities Act is the culmination of a series of civil rights laws guaranteeing the civil rights of individuals with disabilities. Section 504 of the Rehabilitation Act, which was initially enacted in 1973, prohibits discrimination on the basis of disability in programs, activities, and services receiving federal financial assistance. Regulations issued under section 504 generally require recipients of federal funds to provide for accessibility in new construction and alterations of facilities. Schools, parks, and other public entities are commonly recipients of federal funds and had to provide for accessibility in newly constructed and altered play areas since the 1970's. In addition, the Individuals with Disabilities Education Act, which was initially enacted in 1974, requires public schools to provide for accessibility in new construction and alterations of facilities. The Americans

with Disabilities Act reinforces these requirements for public entities covered by title II of the Act and extends the requirements to private entities covered by title III of the Act. These civil rights laws and regulations are closely intertwined and it is not possible to separate their impacts.

The Department of Education and the Department of the Interior are responsible for administratively enforcing section 504 of the Rehabilitation Act and title II of the Americans with Disabilities Act in the case of schools and parks, respectively. The Department of Education also administratively enforces the Individuals with Disabilities Education Act. In a series of administrative complaints filed with these agencies, the Department of Education and Department of the Interior have required schools and parks to provide an accessible route through play areas to a range of play activities, including accessible ground surfaces and use of ramps and transfer systems.[16] The Department of Justice, which is responsible for enforcing titles II and III of the Americans with Disabilities Act, also has issued interpretative guidance that covered entities are required to provide an accessible route to the playground, some accessible equipment, and an accessible surface for the playground.[17]

Degree of Compliance

As noted above, schools, parks, and other public entities which commonly receive federal funds have been required since the 1970's to provide for accessibility in newly constructed and altered facilities. These public entities are required to have Section 504 coordinators who are responsible for ensuring among other things that the accessibility requirements are met. These entities generally have complied with this requirement. With respect to play areas, compliance has been facilitated with the development of the ASTM standards, including the ASTM F 1951 standard, which provides an objective way to measure the accessibility of ground surface materials commonly used in play areas. It is common today for play equipment manufacturers and surface material suppliers to advertise and promote the accessibility of their products through their catalogues and web sites. With the increased availability of accessible play equipment and surface materials in the marketplace and long history of coverage by civil rights and regulations, a high degree of compliance is expected by public entities.

Private entities covered by title III of the Americans with Disabilities Act do not have as long a history of coverage by civil rights laws and regulations as do public entities. Large private entities that operate play areas are more likely to know about developments in the marketplace and the availability of accessible play equipment and surface materials. Smaller private entities that operate play areas may not be as knowledgeable about these matters as large private entities which may affect the level of compliance.

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[16] Letters from the Department of the Interior to Ms. Judith Schmidth-Lehman, Assistant City Attorney, Green Bay, Wisconsin, November 29, 1993 and June 24, 1994. Letter from the Department of Education to Waldeman Rojas, Superintendent, San Francisco Unified School District, November 26, 1995.

[17] Department of Justice, Americans with Disabilities Act Title II Technical Assistance Manual, 1994 Supplement, p. 4.

Comparison of Baseline and Guidelines

The primary difference between the baseline and the guidelines concerns the number of ground level and elevated play components that need to be located on an accessible route, which also effects how much ground surface material complying with the ASTM F 1951 standard must be provided and the extent to which transfer systems and ramps must be provided. As noted above, the ASTM F 1487 standard does not contain scoping provisions. The Department of Education, the Department of the Interior, and the Department of Justice have interpreted the civil rights laws and regulations as requiring a range or some number of ground level and elevated play components to be accessible.

General ly, the baseline assumes that a smaller number of ground level play components are located on an accessible route than required by the guidelines and that a transfer system is provided only to one deck of a composite play structure, making fewer elevated play components accessible than required by the guidelines. The specific differences between the baseline assumptions and the guidelines are discussed in more detail below.

4.3 Model Play Areas [18]

Three model play areas have been selected to represent the different sizes and costs of play areas. The first is a small play area, as may be found in a child care center. The second is a medium play area, as may be found at an elementary school. The third is a large play area, as may be found in a public park. The models are not intended to be representative of all play areas in child care centers, schools, and parks, and these establishments are not limited to the size models. The models were developed for purposes of determining the impact of the guidelines and estimating costs, and are not intended to provide design guidance.

Different ground surface materials were used for each model. For the small play area, the baseline design used a loose fill surface such as sand or wood chips for the entire play area; and the guidelines design used two options: an engineered wood fiber surface for the entire play area (option 1), and a combination of loose fill and a rubber surface along accessible routes, clear floor or ground spaces, and maneuvering spaces (option 2).[19] A loose fill surface was used for the baseline design for the small play area based on comments from child care facilities, which have a large number of small play areas, stating that they would not use an engineered wood fiber surface, or a combination of loose fill and a rubber surface in the absence of the guidelines. For the medium and large play areas, both the baseline designs and the guidelines designs used two options: an engineered wood fiber surface for the entire play area (option 1) and a combination of loose fill and a rubber surface along accessible routes, clear floor or ground spaces, and maneuvering spaces (option 2) because public schools and parks represent a large number of medium and large play areas and it is assumed that these facilities would use surfaces complying with the ASTM F 1951standard in the absence of the

[18] The model play areas and cost estimates in this section were developed by Kevin Owens.

[19] The rubber surface was designed to be as uninterrupted as possible to avoid potential tripping hazards.

guidelines based on the factors discussed above. Some operators, especially in urban areas, have chosen to use a rubber surface for the entire play area in the absence of the guidelines. This assessment overestimates the incremental surface costs for those play areas.

Soft contained play structures are not included in Chapter 5 because the guidelines only require an accessible route to the entry point, a requirement which is satisfied by currently available soft contained play structures without additional cost.

4.3.1 Unit Costs

Tables 4-1, 4-2, and 4-3 list the unit cost ranges used in calculating the costs of the model play areas. The costs are for year 2000 and reflect regional variations in material and labor costs.

Table 4-1. Unit Cost of Surfacing Materials

Surfacing	
loose fill materials	$0.30 - $1.30 per square foot, installed
engineered wood fiber	$0.90 - $3.20 per square foot, installed
rubber mats/tiles	$6.35 - $16.00 per square foot, installed, including underlayment
poured-in-place rubber	$8.50 - $21.00 per square foot, installed, including underlayment
transitions between loose fill and rubber materials	$5.30 - $11.00 per linear foot, installed
border materials	$5.30 - $16.00 per linear foot, installed

Table 4-2. Unit Cost of Equipment Features

Accessible Equipment Features	
12 inch rise of 1:12 ramp	$1,484 - $2,756
ramp landing	$2,120 - $5,512, including barriers
ramp and landing combined, per 12 inch rise	$3,604 - $8,218
transfer platform	$424 - $742
transfer platform with approach step	$742 - $1,590
transfer steps	$106 - $530 per foot of rise
earth berm to 24 inches	$3,710 - $5,830

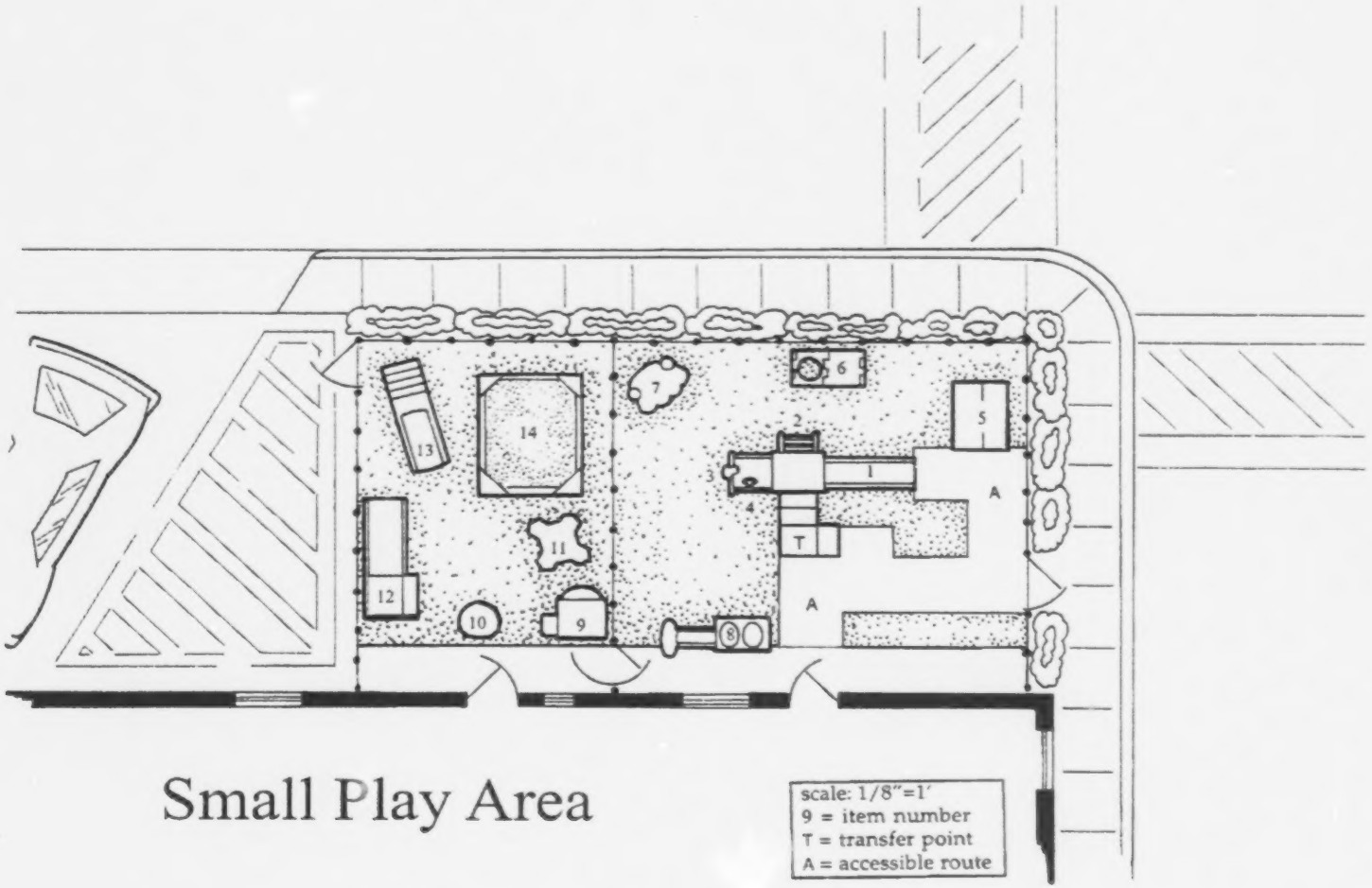
Table 4-3. Unit Cost of Other Items

Other Cost Elements	
stairs	$106 - $265 per foot of rise
ladders and climbers	$32 - $159 per foot of rise
equipment installation	20% - 40% of equipment cost

4.3.2 Small Play Area

The play area on the following page is a small play area that may be found at a child care center. As is typical in child care centers, the play area is divided by age groups served by the facility. The portion on the left is for infants and toddlers under 2 years old. The portion on the right is for children 2 to 5 years old. The infant and toddler play area is not subject to the guidelines. The play area for children ages 2 to 5 contains 4 elevated play components listed in Table 4-4 and 4 ground level play components listed in Table 4-5.

During the comment period on the proposed rule, child care centers noted that many States establish minimum requirements for play space and that based on those requirements the play area model for the economic assessment should be larger. The Access Board has reviewed State child care licensing requirements and has found that they address play space and do not necessarily require playground equipment. The Access Board also contacted over 125 child care centers around the country and found that most of them have 4 to 7 play components in their play areas. Based on this information, no change has been made in the size of the play area model. However, a change has been made in the surfacing material for the baseline design based on the public comments. For the baseline design, all small play areas are assumed to use loose fill for the entire surface.



Small Play Area

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Table 4-4. Small Play Area: Elevated Play Components

Item	Description	Located on Accessible Route	
		Yes	No
1	Slide	✓ T	
2	Climber		✓ [20]
3	Fine Motor Skill Activity	✓ T	
4	Fine Motor Skill Activity	✓ T	
Total	**4**	**3 T**	**1**

T = Transfer System

Table 4-5. Small Play Area: Ground Level Play Components [21]

Item	Description	Different Type	Located on Accessible Route	
			Yes	No
5	Imaginative Play Item	✓	✓	
6	Imaginative Play Item			✓
7	Imaginative Play Item			✓
8	Sand & Water Play Table	✓	✓	
Total	**4**	**2**	**2**	**2**

4.3.2.1 Impact of the Guidelines on Small Play Area

For the baseline design, the small play area for children ages 2 to 5 has a loose fill surface. The composite structure has 4 elevated play components on a single deck and a transfer platform and transfer steps. There also are 4 ground level play components.

The guidelines require that at least 50 percent of the elevated play components, including entry and exit points, be located on an accessible route. This requirement can be satisfied by using an engineered wood fiber surface (option 1) or combination of loose fill and a rubber surface

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[20] Although the top of the climber can be reached by the transfer system, the base of the climber is not located on an accessible route when a combination of loose fill and a rubber surface (option 2) is used. The base of the climber would be located on an accessible route when an engineered wood fiber surface (option 1) is used.

[21] Ground level play components items 9 through 14 are in a separate play area for children under 2 years of age and are not covered by the guidelines.

(option 2) to provide an accessible route to and transfer space at the transfer platform. The combination ground level accessible route and transfer system allows children with disabilities to reach and use the slide and 2 fine motor skill activities on the composite structure. Although the top of the climber can be reached by the transfer system, the base of the climber is not located on an accessible route when a combination of loose fill and a rubber surface (option 2) is used. The surface in the play area for infants and toddlers under age 2 would not be affected by the guidelines and can use loose fill.

The guidelines require that at least one of each type of ground level play component provided be located on an accessible route and have clear floor or ground space and maneuvering space. This requirement can be satisfied by using an engineered wood fiber surface (option 1) or loose fill and a rubber surface that extends to one of the imaginative play items. The sand and water play table does not require a use zone and can be located along a paved walk.[22] The requirement that at least one ground level play component be provided on an accessible route based on the number of elevated play components provided would also be satisfied. See Table 15.6.2.2 of the guidelines.

The accessible route is 44 inches wide as permitted by the guidelines in play areas less than 1,000 square feet. Additionally, the accessible route is not longer than 30 feet and therefore does not require 60 inch turning space. Where the accessible route and surfaces are within use zones, the surface material must be impact attenuating. Surfacing options 1 and 2 satisfy this requirement.

4.3.2.2 Incremental Equipment and Surface Costs for Small Play Area

The incremental equipment and surface costs of the guidelines for the small play area are summarized in Table 4-6. Depending on the surfacing option chosen, the cost of the small play area increases by $300 to $2,215, and ranges from 2.5 percent to 14.4 percent over the baseline. The entire increase is due to the change in ground surfacing materials from loose fill (baseline) to an engineered wood fiber surface (option 1) or a combination of loose fill and a rubber surface (option 2).

This estimate of increase in cost applies best to small play areas where there are few elevated components. In the model, it is relatively easy to provide access to 3 of 4 elevated play components with only one transfer system. Since so few ground based play components are required to be accessible and since child care centers often rely on nonpermanent play items and large toys, it is relatively easy to comply with the guidelines. Additionally, when items have no designated play surfaces that are elevated, such as the sand and water table, it does not need to be located over impact attenuating material and can be located along a paved walk.

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[22] Neither of the imaginative play item nor the sand and water table contain elevated designated play surfaces, as defined in the ASTM F1487 standard, which would require a use zone, and thus those items do not have to be located over impact attenuating material.

Table 4-6. Summary of Costs for Small Play Area

Item	Baseline Cost	Guidelines Cost	Change
Equipment	$ 9,304	$ 9,304	$0
Installation [23]	$1,861 - $3,721	$1,861 - $3,721	$0
Loose Fill [24]	$664 - $2,320	N/A	N/A
Surfacing Option 1 - Engineered Wood Fiber [25]	N/A	$964 - $3,270	$300 - $950
Surfacing Option 2 - Loose Fill & Rubber [26]	N/A	$1,610 - $4,535	$946 - $2,215
Total Play Area With Loose Fill	$11,828 - $15,345	N/A	N/A
Total Play Area With Surfacing Option 1	N/A	$12,128 - $16,295	$300 - $950 (2.5% - 6.2%)
Total Play Area With Surfacing Option 2	N/A	$12,775 - $17,560	$947 - $2,215 (8.0% - 14.4%)

4.3.3 Medium Play Area

The play area on the following page is a medium play area that may be found at an elementary school. The play area contains 10 elevated play components listed in Table 4-7 and 4 ground level play components listed in Table 4-8.

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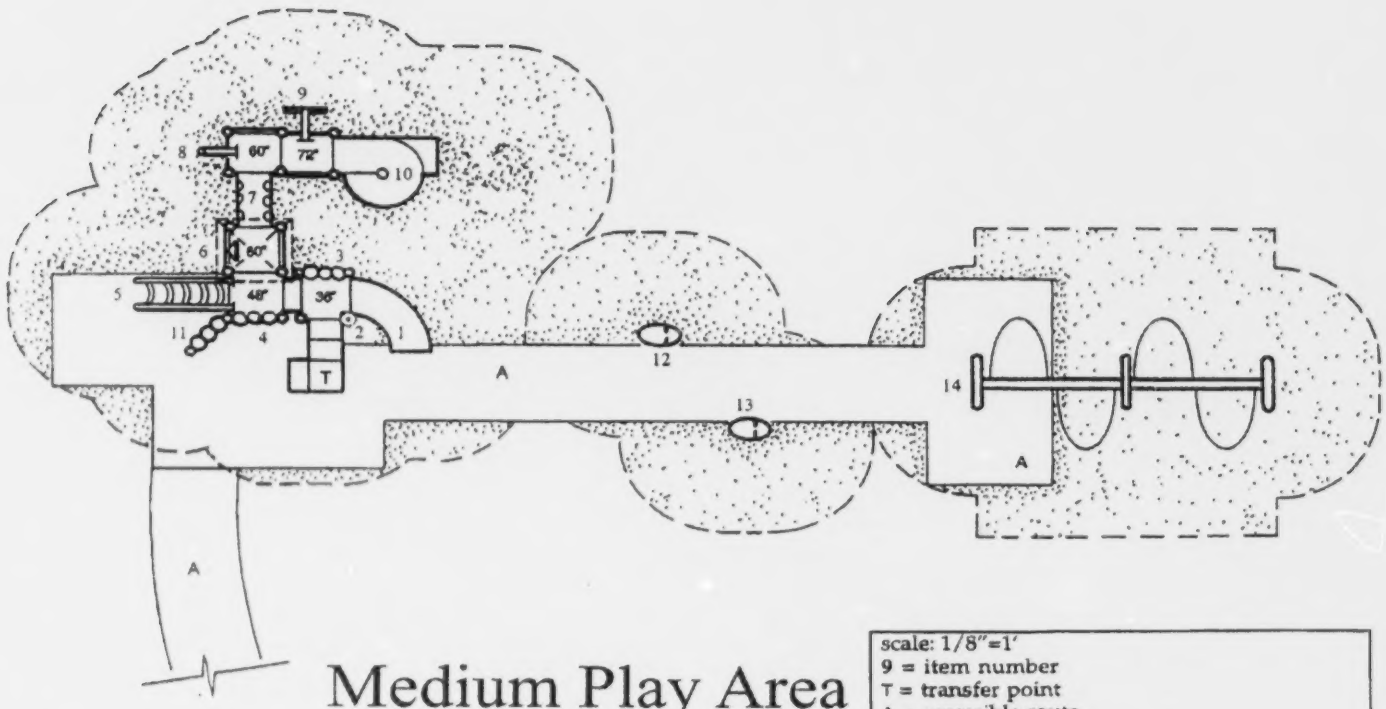
[23] Installation is estimated at 20% to 40% of equipment cost.

[24] Surfacing costs include installation, loose fill, drainage, and border material.

[25] Surfacing costs include installation, engineered wood fiber, drainage, and border material.

[26] Surfacing costs include installation, loose fill, rubber material, underlayment, border material, and transition details between dissimilar materials.



Medium Play Area

scale: 1/8"=1'
9 = item number
T = transfer point
A = accessible route
42"=height above surfacing
Dashed lines indicate perimeter of use zone.

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Table 4-7. Medium Play Area: Elevated Play Components

Item	Description	Located on Accessible Route	
		Yes	No
36 Inch Level			
1	Slide	✓ T	
2	Bell Ringing Activity	✓ T	
3	Fine Motor Skill Activity	✓ T	
48 Inch Level			
4	Fine Motor Skill Activity	✓ T	
5	Climber	✓ T	
60 Inch Level [27]			
6	Fine Motor Skill Activity		✓
7	Crawl Tube		✓
8	Sliding Pole		✓
72 Inch Level			
9	Climber		✓
10	Slide		✓
Total	**10**	**5 T**	**5**

T = Transfer System

Table 4-8. Medium Play Area: Ground Level Play Components

Item	Description	Different Type	Located on Accessible Route	
			Yes	No
11	Fine Motor Skill Activity	✓	✓	
12	Spring Rocker	✓	✓	
13	Spring Rocker		✓	
14	Swings	✓	✓	
Total	**4**	**3**	**4**	

[27] There is a roof over the 60 inch level.

4.3.3.1 Impact of the Guidelines on Medium Play Area

For the baseline design, the medium play area has a composite structure with 10 elevated play components on 3 decks at 36 inch, 60 inch, and 72 inch heights. A transfer platform and transfer steps connect to the 36 inch high deck, where a slide, bell ringing activity, and fine motor skill activity are located. There are 2 spring rockers and a set of swings on the ground level. Where a combination of loose fill and a rubber surface (option 2) is used, the rubber surface only extends from the entrance of the play area to the composite structure and does not connect to any of the ground level play components.

The guidelines require that at least 50 percent of the elevated play components, including entry and exit points, be located on an accessible route. This requirement can be satisfied by adding a 48 inch high deck, relocating a fine motor skill activity and climber from the 60 inch high deck to the 48 inch high deck, and connecting the 36 inch high deck and the 48 inch high deck with a transfer stair. No change to the surface is required where an engineered wood fiber surface (option 1) is used. Additional rubber surface is needed to extend the accessible route to the base of the climber where a combination of loose fill and a rubber surface (option 2) is used. This makes 5 elevated play components located on an accessible route, which includes a transfer system.

The guidelines require that at least one of each type of ground level play component provided be located on an accessible route and have clear floor space and maneuvering space. This requirement is met where an engineered wood fiber surface (option 1) is used. Additional rubber surface is needed to extend the accessible route to the spring rockers and the swings and to provide clear floor space and maneuvering space at those components, where a combination of loose fill and a rubber surface (option 2) is used. To meet the requirement that at least 3 different types of ground level play components be provided on an accessible route based on the number of elevated play components provided, a fine motor skill activity is added at the ground level. See Table 15.6.2.2 of the guidelines. This enlarges the use zone and requires additional surfacing material to extend the accessible route to the fine motor skill activity.

The accessible route is 60 inches wide. Where the accessible routes and surfaces are within use zones, the ground surface material must be impact attenuating. Surfacing options 1 and 2 satisfy this requirement.

4.3.3.2 Incremental Equipment and Surface Costs for Medium Play Area

The incremental equipment and surface costs of the guidelines for the medium play area are summarized in Tables 4-9 and 4-10. Depending on the surfacing option chosen, the equipment and surface cost of the medium play area increases by $1,896 to $7,853, and ranges from 10.1 percent to 30.2 percent over the baseline.

In reviewing the cost information in these tables, it is important to note that the baseline costs are different for surfacing option 1 and option 2. As discussed above, more than half of all medium play areas are expected to be operated by public entities such as schools or parks. These public entities have been subject to other civil rights laws and regulations requiring accessibility since the 1970's. Therefore, the model medium play area assumes that, in the baseline, a significant portion of the play area surface is accessible. The incremental effect of this rule is to increase the number of play components that are located on an accessible route.

To meet their existing obligation for accessibility, operators are assumed to have examined the full costs (capital and maintenance costs) of different surfacing options and have chosen the least costly option for their play area. Some operators will have chosen materials like engineered wood fiber that are cheaper to install but may require more frequent maintenance. Other operators may find it more economical to install a rubber surface along accessible routes, clear floor or ground spaces, and maneuvering spaces and use loose fill for the remaining area. To measure the incremental costs of the guidelines, we assume operators will choose the same surfacing approach. For example, an operator using an engineered wood fiber surface (option 1) in the baseline design, will use an engineered wood fiber surface (option1) in the guidelines design. The additional surfacing costs are the costs to create this new area. Based on which surfacing option is selected, the baseline costs are different.

Table 4-9. Summary of Costs For Medium Play Area

Item	Baseline Cost	Guidelines Cost	Change
Equipment	$13,533	$14,933	$1,400
Installation [28]	$2,707 - $5,413	$2,987 - $5,973	$280 - $560
Surfacing Option 1 - Engineered Wood Fiber [29]	$2,500 - $8,416	$2,716 - $9,126	$216 - $710
Surfacing Option 2 - Loose Fill & Rubber Surface [30]	$2,297 - $7,046	$4,749 - $12,939	$2,452 - $5,893
Total Play Area With Surfacing Option 1	$18,740 - $27,362	$20,636 - $30,032	$1,896 - $2,670 (10.1% - 9.8%)
Total Play Area With Surfacing Option 2	$18,537 - $25,992	$22,669 - $33,845	$4132 - $7,853 (22.3% - 30.2%)

[28] Installation is estimated at 20% to 40% of installation.

[29] Surfacing costs include installation, engineered wood fiber, drainage, and border material.

[30] Surfacing costs include installation, loose fill, rubber material, underlayment, border material, and transition details between dissimilar materials.

Table 4-10. Sources of Increased Costs for Medium Play Area

Item	Equipment Cost	Surfacing Cost	
		Option 1	Option 2
Transfer System To Elevated Play Components	$1,005 [31] plus $201 - $402 installation (72%)	$0 [32] (0%)	$552 - $1,326 [33] (23%)
Ground Level Play Components	$395 [34] plus $79 - $158 installation (28%)	$216 - $710 [35] (100%)	$1,900 -$4,567 [36] (77%)
Total	$1,400 plus $280 - $560 installation (100%)	$216 - $710 (100%)	$2,452 - $5,893 (100%)

4.3.4 Large Play Area

The play area on the following page is a large play area that may be found at a park. The play area contains 20 elevated play components listed in Table 4-1 and 8 ground level play components listed in Table 4-11.

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[31] Additional cost is for transfer stair between the 36 inch and 48 inch levels, associated support posts, one barrier, and one deck.

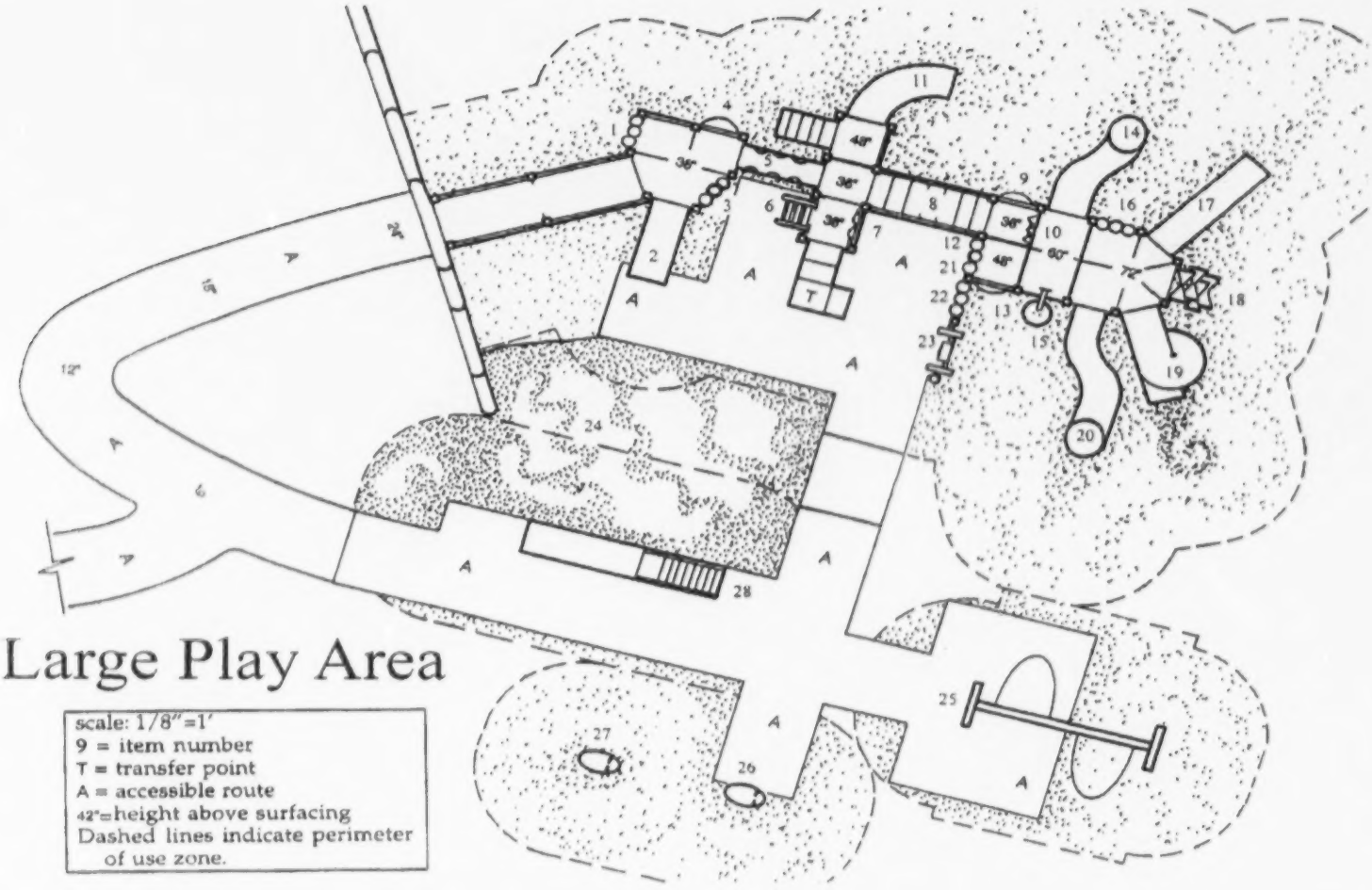
[32] No change is needed to engineered wood fiber surface to reach the transfer system or base of climber **5**.

[33] Additional rubber material is needed to extend accessible route around fine motor skill activity **11** and to the base of climber **5**.

[34] Additional cost is for fine motor skill activity **11** and associated support posts.

[35] Additional engineered wood fiber and border materials are needed because the use zone is enlarged with the addition of fine motor skill activity **11**.

[36] Additional rubber material is needed to extend the accessible route at entrance to the play area because use zone enlarged by addition of fine motor skill activity **11**, and to extend the accessible route to spring rockers **12** and **13** and swings **14**.



Large Play Area

Table 4-11. Large Play Area: Elevated Play Components

Item	Description	Located on Accessible Route	
		Yes	No
36 Inch Level			
1	Fine Motor Skill Activity	✓ R	
2	Slide	✓ R	
3	Fine Motor Skill Activity	✓ R	
4	Bubble Window	✓ R	
5	Crawl Tube	✓ R/T	
6	Ladder Climber	✓ T	
7	Fine Motor Skill Activity	✓ T	
8	Swinging Bridge	✓ T	
9	Bubble Window	✓ T	
10	Fine Motor Skill Activity	✓ T	
48 Inch Level			
11	Slide		✓
12	Fine Motor Skill Activity		✓
13	Bubble Window		✓
60 Inch Level			
14	Slide		✓
15	Climber		✓
72 Inch Level			
16	Fine Motor Skill Activity		✓
17	Slide		✓
18	Climber		✓
19	Slide		✓
20	Slide		✓
Total	**20**	**4R; 1 R/T; 5 T**	**10**

R = Ramp; R/T = Ramp and Transfer System; T = Transfer System

Table 4-12. Large Play Area: Ground Level Play Components

Item	Description	Different Type	Located on Accessible Route	
			Yes	No
21	Fine Motor Skill Activity	✓	✓	
22	Fine Motor Skill Activity		✓	
23	Gross Motor Skill Activity	✓	✓	
24	Sand Play Area	✓	✓	
25	Swings	✓	✓	
26	Spring Rocker	✓	✓	
27	Spring Rocker			✓
28	Slide	✓	✓	
Total	8	6	7	1

4.3.4.1 Impact of the Guidelines on Large Play Area

For the baseline design, the large play area has a composite structure with 20 elevated components on multiple decks ranging from 36 inches to 72 inches. A transfer platform and transfer steps connect to the deck at one of the 36 inch high decks, where a crawl tube, a ladder climber, a fine motor skill activity, and a swinging bridge are located. The swinging bridge connects the 36 inch high deck to another deck at the same height, where a bubble window and another fine motor skill activity are located. The transfer system and accessible route at the ground level allows children with disabilities to reach and use these 6 elevated play components. There are 6 ground level play components, which include 5 different types: a fine motor skill activity, a sand play area, swings, 2 spring rockers, and a slide. Where a combination of loose fill and a rubber surface (option 2) is used, the rubber material only connects an entrance to the play area next to the sand play area and the composite structure, the sand play area, the transfer system at the 36 inch high deck, and a fine motor skill activity at ground level adjacent to the composite structure.

The guidelines require that at least 50 percent of the elevated play components, including entry and exit points, be located on an accessible route. Since there are 20 elevated play components, no more than 25 percent of the elevated components are permitted to be connected by a transfer system. Ramp access must be provided to the other 25 percent of the elevated play components. This requirement can be satisfied by constructing an earthen berm to a 24 inch elevation near the composite play structure, extending a 36 inch high deck, and connecting the deck to the berm with a ramp. There are 2 fine motor skill activities, a slide, a bubble window, and a crawl tube on the other 36 inch high deck. The crawl tube also connects the 36 inch high deck that is

reached by the transfer system. By adding the berm and ramp, a total of 10 elevated play components are located on an accessible route: 25 percent are reached by transfer system and 25 percent are accessed by the berm and ramp. Additional surfacing is needed at the ground level along the accessible route due to the use zones being enlarged by the extension of the deck and addition of the ramp.

The guidelines require that at least one of each type of ground level play component provided be located on an accessible route and have clear floor space and maneuvering space. This requirement is met where an engineered wood fiber surface (option 1) is used. Additional rubber surface is needed to extend the accessible route to the swings, a spring rocker, and the slide and to provide clear floor spaces and maneuvering spaces at those play components, where a combination of loose fill and a rubber surface (option 2) is used. To meet the requirement that at least 7 ground level play components be provided on an accessible route based on the number of elevated play components provided, an additional fine motor skill activity and a gross motor skill activity is added at the ground level. See Table 15.6.2.2 of the guidelines. Additional rubber surface is needed to extend the accessible route to these additional ground level play components where a combination of loose fill and a rubber surface (option 2) is used. The requirement that at least 4 different types of ground level play components be provided on an accessible route is met by the baseline design.

The accessible route is 60 inches wide. Where the accessible routes and surfaces are within use zones, the ground surface material must be impact attenuating. Surfacing options 1 and 2 satisfy this requirement.

4.3.4.2 Incremental Equipment and Surface Costs for Large Play Area

The incremental equipment and surface costs of the guidelines for the large play area are summarized in Tables 4-13 and 4-14. Depending on the surfacing option chosen, the equipment and surface cost of the large play area increases by $9,229 to $16,511, and ranges from 21.6 percent to 28.6 percent over the baseline. The increase is due to both additional equipment and additional surfacing material being required. As discussed in the medium play area, the baseline cost for surfacing options 1 and option 2 differ and assume that operators made a decision as to which surfacing option has the lowest overall cost.

An earthen berm was used as part of an accessible route in this model. The purpose of this topographic feature is to gain some elevation along the accessible route outside of the equipment use zone before reaching the ramp.[57] If the berm were not used, 2 additional ramp runs and 2 additional ramp landings would have been required in its place. Each ramp run and landing would each require a full 6 feet use zone of impact attenuating surfacing.

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[57] In the ASTM F 1487 standard, there is an exemption to the normal 6 feet use zone at the entrance point of a ramp, which allows the accessible route to meet the ramp entrance without the use of impact attenuating surfacing.

Even though an earthen berm makes a less direct elevation gain (1:20 maximum) than a ramp (1:12 maximum), it may offer some cost savings in certain play sites, depending on availability and cost of local materials and labor. In this example, the berm added approximately $4,346 to the overall play area cost (including retaining wall, paving, fill, lowest-cost landscaping materials, and installation). Ramps and landings to reach the same elevation (24 inches) would cost anywhere from $3,584 to $8,268 depending on type of equipment used, plus $717 to $3,308 for installation, depending on type of equipment and labor rates used. Approximately 500 square feet of impact attenuating surfacing would be required around this amount of ramping at a cost of $150 to $8,000, depending on type of surfacing chosen.

In this model, the berm is a more economical choice to accomplish elevation gain than the full use of ramps and landings. However, berms do require more land area and may require more maintenance. Berms may be more economical to reach heights of 24 inches or less. Above this height there are considerably larger structural and fill issues to solve. However, if natural topographic changes exist on a site and can be incorporated into the play area with ramps, this approach may be an effective way of reducing the cost of accessibility.

Table 4-13. Summary of Costs for Large Play Area

Item	Baseline Cost	Guidelines Cost	Change
Equipment and Berm	$32,454	$40,711	$8,257
Installation [38]	$6,491 - $12,982	$7,273 - $14,456	$782 - $1,564
Surfacing Option 1 - Engineered Wood Fiber [39]	$3,689 - $12,496	$3,879 - $13,117	$190 - $621
Surfacing Option 2 - Loose Fill & Rubber Surface [40]	$4,566 - $12,252	$6,985 - $18,942	$2,419 - $6,690
Total Play Area With Surfacing Option 1	$42,634 - $57,932	$51,863 - $68,284	**$9,229 - $10,352** (21.6% - 17.9%)
Total Play Area With Surfacing Option 2	$43,511 - $57, 688	$54,969 - $74,109	**$11,458 - $16,421** (26.3% - 27.5%)

[38] Installation is estimated at 20% to 40% of equipment cost.

[39] Surfacing costs include installation, engineered wood fiber, drainage, and border material.

[40] Surfacing costs include installation, loose fill, rubber material, underlayment, border material, and transition details between dissimilar materials.

Table 4-14. Sources of Increased Costs for Large Play Area

Item	Equipment Cost	Surfacing Cost	
		Option 1	Option 2
Earth Berm and Ramp to Elevated Play Components	$7,098 [41] plus $550 -$1,100 installation (84%)	$190 - $621 [42] (100%)	$106 - $320 [43] (5%)
Transfer System to Elevated Play Components	$0 [44] (0%)	$0 (0%)	$0 (0%)
Ground Level Play Components	$1,159 [45] plus $232 - $464 installation (16%)	$0 (0%)	$2,313 - $6,370 [46] (95%)
Total	**$8,257** plus $782 - $1,564 installation (100%)	**$190 - $621** (100%)	**$2,419 - $6,690** (100%)

[41] Additional cost is for berm, ramp, and deck extension, minus the cost of equipment removed to make the modular system workout from the baseline design to the guidelines design.

[42] 94 square feet of engineered wood fiber and its associated border material must be added.

[43] 94 square feet of loose fill and its associated border material must be added.

[44] No additional cost is expected because, in this particular design, efficient placement of the transfer system near a connecting play component such as a bridge that connects two decks of the same level, provides several locations for play activities at the same level, allowing 25% of the elevated play components to be reached by the transfer system.

[45] Additional cost is from fine motor skill activity **22** and gross motor skill activity **23**, and associated support posts.

[46] Additional cost to provide accessible route to swings **25**, spring rocker **26**, and slide **28**.

4.3.5 Summary of Incremental Equipment and Surface Costs

Table 4-15 summarizes the incremental equipment and surface costs for the model play areas used in this assessment. Some operators, especially in urban areas, have chosen to use a rubber surface for the entire play area in the absence of the guidelines. Table 4-15 overestimates the incremental surface costs for those play areas.

Table 4-15. Summary of Incremental Equipment and Installation Costs for Play Areas

Size	Baseline		Final Rule		Percent Change
	Low	High	Low	High	
Surfacing Option 1: Engineered Wood Fiber (Baseline for Small is Loose Fill)					
Small	$11,828	$15,345	$12,128	$16,295	2.5% - 6.2%
Medium	$18,740	$27,362	$20,636	$30,032	10.1% - 9.8%
Large	$42,634	$57,932	$51,863	$68,284	21.6% - 17.9%
Surfacing Option 2: Loose Fill & Rubber Surface					
Small	$11,828	$15,345	$12,775	$17,560	8.0% - 14.4%
Medium	$18,537	$25,992	$22,669	$33,845	22.3% - 30.2%
Large	$43,511	$57,688	$54,969	$74,109	26.3% - 28.5%

4.4 Maintenance Costs

In addition to the equipment and surface costs, the guidelines will affect the maintenance costs of a play area. The guidelines provide that ground surfaces along accessible routes, clear floor or ground spaces, and maneuvering spaces must be inspected and maintained regularly and frequently to ensure continued compliance with the ASTM F 1951 standard. This section describes the impact of this provision and estimates the incremental maintenance costs.

4.4.1 Unit Costs

Operators generally have three types of maintenance activities: inspecting the surface, raking and leveling the surface as material is displaced from use or climate, and replacing or "topping-off" material as the original material deteriorates. The rate and frequency of each of these maintenance activities varies depending on the type of surface. Table 4-16 summarizes the typical frequency of maintenance activities for various surfaces.

Table 4-16. Typical Maintenance Frequencies

Maintenance Activity	Loose Fill	Engineered Wood Fiber	Rubber
Inspection	Daily to Weekly	Daily to Weekly	Weekly
Rake & Level	Daily to Weekly	Weekly to as required	Not Required
Top Off	1 to 3 years	3 years	Not Required

Source: Henderson, Walter. *Catching Kids When They Fall: Guidelines to Choosing a Playground Surface*. Parks & Recreation, April 1997, pp. 84-92.

To quantify the maintenance costs, we examined product manufacturer literature.[47,48] A recent article reports on maintenance costs for different regional parks and play area surfaces.[49] Although the goal of the maintenance is to preserve safety standards, the results can be applied to the guidelines. We developed unit costs to estimate the incremental maintenance costs due to the guidelines. For example, the annual inspection cost is the product of the area of play surface, the inspection rate, the inspection frequency, and the hourly labor rate. The annual maintenance cost is the sum of the annual inspection cost, the annual rake and level cost, and the annual "top-off" cost, if applicable. The maintenance cost components, the values used, and the source of the values are listed in Table 4-17.

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[47] Letter from Mr. Robert Heath, President, Fibar, Inc., to Ms. Peggy Greenwell, Accessibility Specialist, Access Board, regarding the recommended maintenance schedule and activities necessary to ensure the playground surface complies with ASTM F 1951 for engineered wood fiber surfacing. Dated October 21, 1999

[48] Letter from Mr. Ted Illjes, Research and Development, Zeager Bros. Inc., to Ms. Peggy Greenwell, Accessibility Specialist, Access Board, regarding the recommended maintenance and installation instructions for engineered wood fiber surfacing. Dated October 11, 1999.

[49] Henderson, Walter. *Catching Kids When They Fall: Guidelines to Choosing a Playground Surface*, Parks & Recreation, April 1997, pp. 84-92. (Hereinafter referred to as "Parks & Recreation Article.")

Table 4-17. Unit Maintenance Costs

Activity/Item	Value	Source/Assumption
Inspection Rate	22 min/5000 ft^2	Parks & Recreation Article
Inspection Frequency	156 times/year	Parks & Recreation Article; mid-point of 3 times/week used
Engineered Wood Fiber Rake & Level Rate	2.0 hrs/2000 ft^2	Manufacturer's recommendation, 1 to 2 hrs. per 2000 ft^2; upper bound used
Engineered Wood Fiber Rake & Level Frequency	52 times per year	Manufacturer's recommendation; Parks & Recreation Article
Loose Fill Rake & Level Rate	0.75 hrs/2000 ft^2	Assume half of mid-point of range for engineered wood fiber
Loose Fill Rake & Level Frequency	156 times/year	Parks & Recreation Article; mid-point of 3 times/week used
Engineered Wood Fiber Top-Off Rate	2.5 hrs/5000 ft^2	Parks & Recreation Article; value for wood chips; assume comparable rate for engineered wood fiber
Engineered Wood Fiber Top-Off Frequency	3 yrs	Manufacturer's recommendation; Parks & Recreation Article
Engineered Wood Fiber Material Cost	$0.11 per ft^2	Replace 3 in depth at $12 cub. yd
Loose Fill Top-Off Rate	1.25 hrs/5000 ft^2	Assume ½ of engineered wood fiber rate
Loose Fill Top-Off Frequency	1.5 yrs	Parks & Recreation Article; mid-point used
Loose Fill Material Cost	$0.037 per ft^2	Assume 1/3 of engineered wood fiber
Labor Rate	$16 per hour	Parks & Recreation Article

4.4.2 Impact of Guidelines on Play Area Use Zones and Accessible Surfaces

Table 4-18 shows how the guidelines affect the size of the use zones and surfaces along accessible routes, clear floor or ground surfaces, and maneuvering spaces for the model play areas.

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Table 4-18. Change in Model Play Areas
(square feet)

Model Play Area	Use Zones			Accessible Surfaces		
	Baseline	Guidelines	Increase	Baseline	Guidelines	Change
Small	500	500	0	0	117	117
Medium	1800	1922	122	108	397	289
Large	2815	2909	94	242	609	467

For the small play area, loose fill is used for the 500 square feet of use zone space in the baseline design. If an engineered wood surface (option 1) is used in the guidelines design, that material would cover the entire 500 square feet of use zone space. Compared to the baseline design, maintenance costs will be lower since engineered wood fiber (option 1) is raked and leveled and topped-off less frequently than loose fill. If a combination of loose fill and a rubber surface (option 2) is used in the guidelines design, the rubber surface would cover 117 square feet of accessible surfaces along the accessible routes, clear floor or ground spaces, and maneuvering spaces. Compared to the baseline design, the maintenance costs will be lower for 23 percent of the play area since the rubber surface does not have to be raked and leveled or topped-off.

For the medium and large play areas, either an engineered wood fiber surface (option 1) or a combination of loose fill and a rubber surface (option 2) is used in the baseline design. If engineered wood fiber (option 1) is used in the guidelines design, an additional 122 square feet of that material would be needed for the expanded use zones in the medium play area, and additional 94 square feet of that material would be needed for the expanded use zones in the large play area. Compared to the baseline design, the maintenance costs would increase due to the need to maintain the additional engineered wood fiber surface. If a combination of loose fill and a rubber surface (option 2) is used in the guidelines design, the rubber surface would cover an additional 289 square feet of the medium play area and an additional 467 square feet of the large play area along the accessible routes, clear floor or ground space, and maneuvering space. Compared to the baseline designs, the maintenance costs would be lower for 16 percent of the medium and large play areas since the rubber surface does not need to raked and leveled or topped-off.

4.4.3 Incremental Maintenance Costs (Savings)

To aggregate routine maintenance costs with the one-time capital and installation costs, the maintenance costs are expressed as the present value of the annual maintenance costs for 15 years, discounted at a 7 percent rate of return. Table 4-19 shows the incremental maintenance costs (savings). Although some of the values are listed as savings, these savings are relative to the baseline maintenance costs. In other words, although the guidelines may reduce maintenance costs for small play areas using a loose fill surface, or medium and large play areas using a combination of loose fill and a rubber surface, the total costs of these play areas (i.e., capital plus the maintenance

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costs) will increase for most play areas.

Table 4-19. Incremental Maintenance Costs (Savings)
(present value, 7% over 15 yrs)

Model Play Area	Option 1	Option 2
Small	$(490)	$(1,200)
Medium	$1,170	$(2,980)
Large	$900	$(4,810)

Table 4-19 gives fixed values, rather than a range of values shown for the equipment and surface costs. The maintenance costs are based on the change in the use zone and the accessible surface areas in Table 4-17, which are presented as single values. Therefore, the cost estimates are also presented as single values. There is uncertainty surrounding the maintenance cost estimates; the values in Table 4-19 are the best estimates of the change in maintenance costs.

4.5 Aggregate Costs

4.5.1 Full Incremental Costs (Savings)

Table 4-20 combines the incremental equipment and surfacing costs from Table 4-15 and the incremental maintenance costs (savings) from Table 4-19 to yield the full incremental costs (savings) of the guidelines.

Table 4-20. Full Incremental Costs (Savings)

Size	Low	High
Surfacing Option 1: Engineered Wood Fiber		
Small	$(190)	$460
Medium	$3,100	$3,800
Large	$10,100	$11,300
Surfacing Option 2: Loose Fill & Rubber		
Small	$(260)	$1,000
Medium	$1,200	$4,900
Large	$6,600	$11,600

The estimates in Table 4-20 are derived by taking the mid-point of the range of the incremental equipment and surface costs and then adding in the present value of the incremental maintenance costs. Collapsing the range to a single value is not meant to understate the uncertainty in these estimates. The simplification eases the aggregation to estimate nationwide costs of the final rule.

As shown in the above table, the guidelines could yield savings in certain instances. The expense

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of installing higher priced surfacing that needs less maintenance could be less than the expense of installing a lower priced surfacing that needs more maintenance. This situation is most likely to occur in regions with relatively high labor rates. While there are some situations where the guidelines could produce savings, the majority of play areas will face increased costs because of the guidelines.

4.5.2 Social Cost of Guidelines

The guidelines will increase the cost of new and replacement play areas built in the United States. The cost increase will affect the number of new and replacement play areas built in the future. Operators that would have built a play area at a lower cost may choose not to build one at the higher cost, or may build a smaller play area. Operators of existing play areas may defer replacing their existing play areas rather than make the replaced play area subject to the guidelines. Operators may even remove play areas once they reach the end of their useful life. This loss of play opportunities is the social cost of the guidelines.

To calculate the social cost of the guidelines, we assume that the pre-existing demand for play areas represented society's value of play area opportunities. The provision of play areas occurs in a free market. Operators such as restaurants or motels weigh how much value they will receive if they add a play area versus other amenities and choose accordingly. Similarly, non-profit groups such as parent-teacher organizations and other civic groups trade off the relative costs and benefits of donating play areas or of donating other equipment (e.g., computers) to schools and the community. If individual consumers are free to make these trade-offs, society's annual demand for new and replacement play areas is the total value they give to society. This value is measured by the price and the total quantity purchased by all individual consumers.

Figure 4-1 illustrates this social demand curve for play areas. The annual demand for play areas prior to the guidelines is measured at P_1 and Q_1. Figure 4-1 also shows the effect of the guidelines. As the price increases from P_1 to P_2, consumers demand less play areas in the future. Since the demand curve (D) measures society's demand for play areas, the new number of play areas society is willing to pay for is Q_2. Society gives up the value measured by the triangle ABC. This triangle represents the social cost of the guidelines.

As shown in Figure 4-1, the slope of the society's demand curve partially determines the size of the social cost, measured by triangle ABC. The slope of the consumer demand curve is measured by the elasticity of demand. Researchers calculate the elasticity of demand for a specific good or service by observing consumer behavior (i.e., how much of a good is bought when the price of the good fluctuates). The elasticity (e) of demand is calculated as the ratio of the percentage change in quantity demanded divided by the percentage change in price.